FCC RADIO TEST REPORT

FCC ID	:	**2AXSZ5GMNN261**
Equipment	:	**Verizon Auto-Certification Platform - 5G MM 28GHz**
Brand Name	:	**Verizon, Amantya**
Model Name	:	**5GTP202MMN261**
Applicant	:	**Amantya Technologies, inc 2803, Philadelphia Pike, Suite B 304 Claymont, DE 19703 United States**
Manufacturer	:	**Amantya Technologies, inc 2803, Philadelphia Pike, Suite B 304 Claymont, DE 19703 United States**
Standard	:	**FCC 47 CFR Part 2, and 30**

The product was received on May 04, 2021 and testing was started from May 11, 2021 and completed on Jun 18, 2021. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures ANSI C63.26-2015 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory
No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)

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Appendix A. Test Results of EIRP: NR Band n261

Appendix B. Radiated Test

Appendix B.1 Radiated Test: NR Band n261 (Beam ID: 11+139)

Appendix B.2 Radiated Test: NR Band n261 (Beam ID: 12)

Appendix B.3 Radiated Test: NR Band n261 (Beam ID: 139)

Appendix C. R&S Mixer Certificate

Appendix D. Calibration Certificate of Standard Gain Horn Antennas

Appendix E. Test Setup Photos

History of this test report

Report No.	Version	Description	Issued Date
FG142801	01	Initial issue of report	Jun. 23, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Limit	Result (PASS/FAIL)	Remark
3.4	§2.1046 §30.202	EIRP PSD Measurement	+75dBm/100MHz	Pass	-
3.5	§2.1049	Occupied Bandwidth	Not Applicable	Reporting only	-
3.6	§2.1053 §30.203	Radiated Unwanted Emission	-5dBm/MHz -13dBm/MHz	Pass	-
3.7	§2.1055	Frequency Stability for Temperature & Voltage	Within the band	Pass	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Steve Chen
Report Producer: Dara Chiu

1 General Description

1.1 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Verizon Auto-Certification Platform - 5G MM 28GHz
Brand Name	Verizon, Amantya
Model Name	5GTP202MMN261
FCC ID	2AXSZ5GMNN261
EUT supports Radios application	5G NR

EUT Information List	
S/N	Performed Test Item
#2	All test items

Remark: Sample S/N number is under internal control.

1.2 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Device Category in Part 30	Fixed and Base Stations
Tx Frequency	27.5GHz ~ 28.35GHz
Rx Frequency	27.5GHz ~ 28.35GHz
Support Bandwidth	100 MHz per CC
Number of contiguous CC	1, 2 and 4
Maximum Aggregated Bandwidth	400MHz
Maximum Output Power (EIRP)	NR band n261: 49.72 dBm
Test Model	E-TM1.1
Type of Modulation	CP-OFDM,QPSK,16QAM,64QAM

Note: Highest EIRP was measured on dual beam case for n261 band.

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Test Site	Sporton International Inc. Wensan Laboratory			
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855			
Test Site Information	Site No.	Engineer	Temperature	Humidity
	03CH19-HY	Leo Liu	23.5 ~ 24.6 ˚C	51.1 ~ 54.7 %

FCC Designation No. TW3786

Note: The highest accredited frequency is 280GHz and the ISO 17025 accreditation letter can be found on TAF (Taiwan Accreditation Foundation) Website (Website link).

1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 2, 30
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 842590 D01 Upper Microwave Flexible Use Service v01r02

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

The EUT was set to 1CC (Component Carriers), 2CC and 4CC operation modes. Each CC supports 100 MHz bandwidth, and a maximum of 400 MHz bandwidth can be achieved with 4CC configuration.

The EUT supports single beam operation (SISO) and dual beams transmitted simultaneously (MIMO) and the detail of product operation is in the operation description document as submitted in separate document. Preliminary EIRP test was performed for all beam configurations in the anechoic chamber at the manufacturer's facility so the EIRP worst case beam-pair were identified. EIRP was investigated that the dual beams' rated maximum EIRP is higher than single beam's one. The NR radio operation is controlled via software tool QRCT FTM mode (Factory mode).

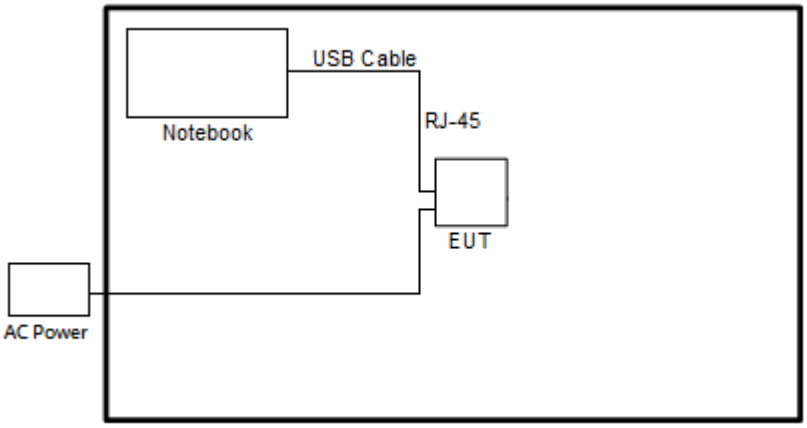
The EUT is forced to operate continuously (74% duty cycle) with maximum output power during the test.

2.1 Test Mode

For radiated measurement, the pre-scan is performed to find the worst cases EUT position.

Test Items	Band	1CC Bandwidth (MHz)	2CC Bandwidth (MHz)	4CC Bandwidth (MHz)	Modulation			Test Channel		
		100	200	400	QPSK	16QAM	64QAM	L	M	H
EIRP	n261	v	v	v	v	v	v	v	v	v
99% Occupied Bandwidth	n261	v	v	v	v	v	v	v	v	v
Out of Band Emission	n261	v	v	v	v			v	v	v
Spurious Emission	n261	v	v	v	v			v	v	v
Frequency Stability	n261	CW tone							v	
Remark	1. The mark "v" means that this configuration is chosen for testing. 2. For the EIRP of fundamental signal, the worst conditions are reported accordingly. The total channel power was measured and compared to the limit. If the measured total EIRP is less than the EIRP density limit, the device is compliant since the total power is always greater than the partial power. 3. Due to the 74 % duty cycle, there is a duty factor of 1.3 dB. 4. The worst condition of the EIRP of fundamental signal is chosen for radiated spurious emission from 30MHz to 200GHz for supporting bands, respectively. 5. For Out of band emissions, emissions are evaluated and reported accordingly. 6. Spurious and Out of Band emissions are initially measured by using radiated EIRP method. If EIRP measurement results exceed the emission limit, then TRP measurement will be used for official test report. Test results of TRP measurement are marked as "TRP Measurement".									

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Notebook	Acer	N16P7	N/A	N/A	AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m

Remark: Applicant has ensured support unit would not be attached with the product on the market, support unit is provided by lab for testing.

2.4 Measurement Results Explanation Example

According to ANSI C63.26-2015 Section 5.2.7

EIRP (dBm) = E(dBuV/m) + 20log (D) -104.8.

where D is the measurement distance (in the far field region) in m.

E (dBuV/m) = Spectrum Reading Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 107

Hence, the spectrum analyzer *Offset* is derived including RF cable loss and antenna factor.

Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

The conversion loss of RF mixer is also included by the mixer table of spectrum analyzer when measurement frequency is above 40GHz.

Example :

Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 42.3 + 3.0 + 107 + 20log(1) – 104.8

= 47.5 (dB)

2.5 Far Field Condition for Frequency above 18GHz

Horn Antenna	Frequency (GHz)	Antenna Dimension A (mm)	Wavelength (λ) (m)	Far field R (m) >= $2A^2/\lambda$	Measurement Distance (D) (m)	Distance Factor 20log(D) (dB)
BBHA 9170	18	60	0.0167	0.43	3	9.54
	40	60	0.0075	0.96		
QWH-UPRR00	40	48	0.0075	0.61	3	9.54
	60	48	0.0050	0.92		
QWH-EPRR00	60	31	0.0050	0.38	3	9.54
	90	31	0.0033	0.58		
QWH-FPRR00	90	21	0.0033	0.26	1	0
	100	21	0.0030	0.29		

2.6 Frequency List of Low/Middle/High Channels

NR Band n261 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
100	Frequency 1	27550.08	27924.96	28299.96
200 (2CC: 100+100)	Frequency 1	27550.08	27875.04	28200.00
	Frequency 2	27650.04	27975.00	28299.96
400 (4CC: 100x4)	Frequency 1	27550.08	27775.08	28000.08
	Frequency 2	27650.04	27875.04	28100.04
	Frequency 3	27750.00	27975.00	28200.00
	Frequency 4	27849.96	28074.96	28299.96

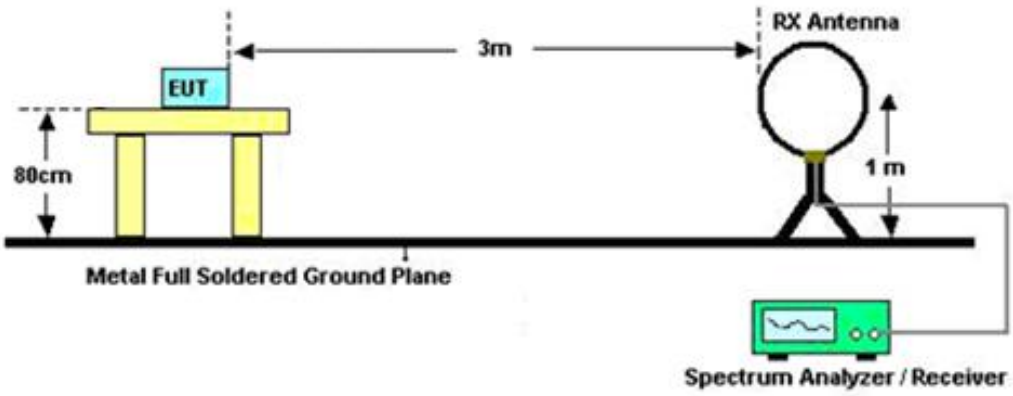
3 Radiated Test Items

3.1 Measuring Instruments

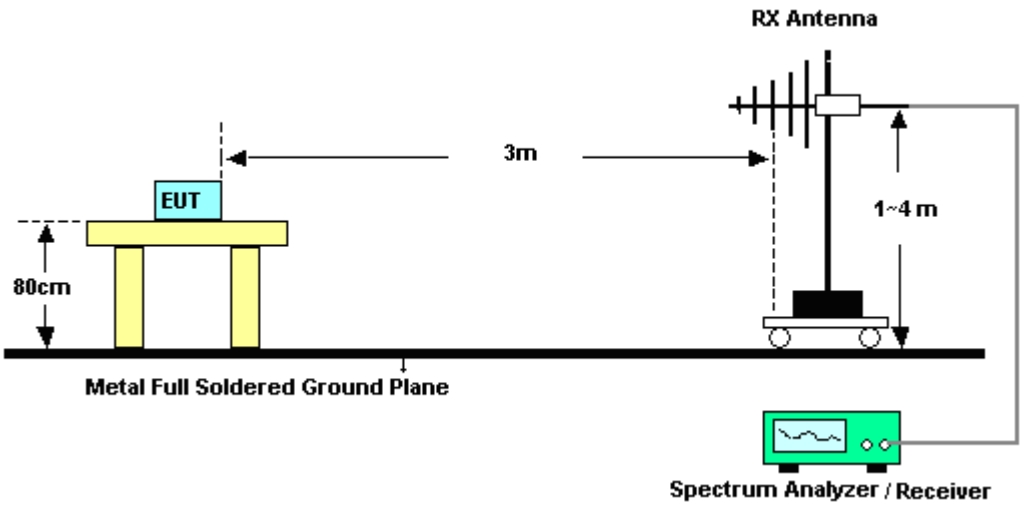
See list of measuring instruments of this test report.

3.2 Test Setup

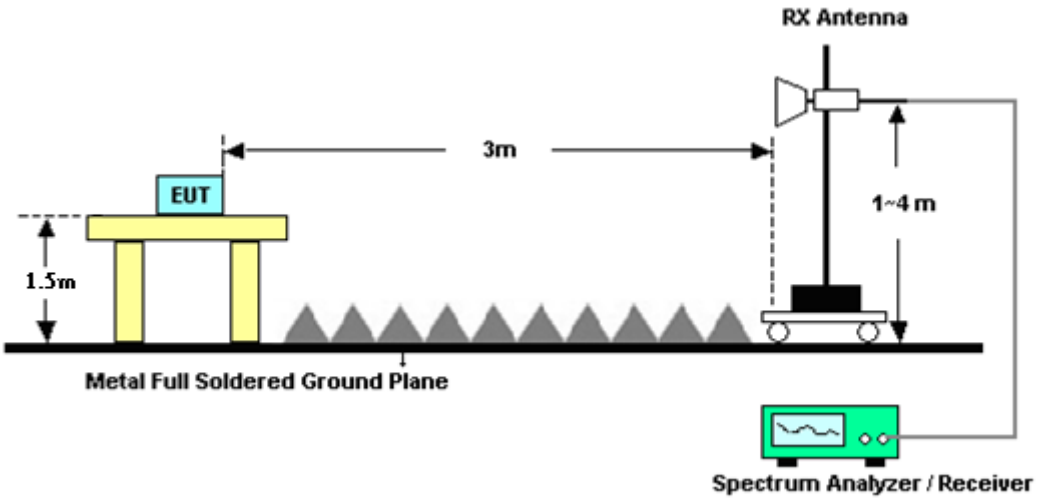
For radiated emissions below 30MHz



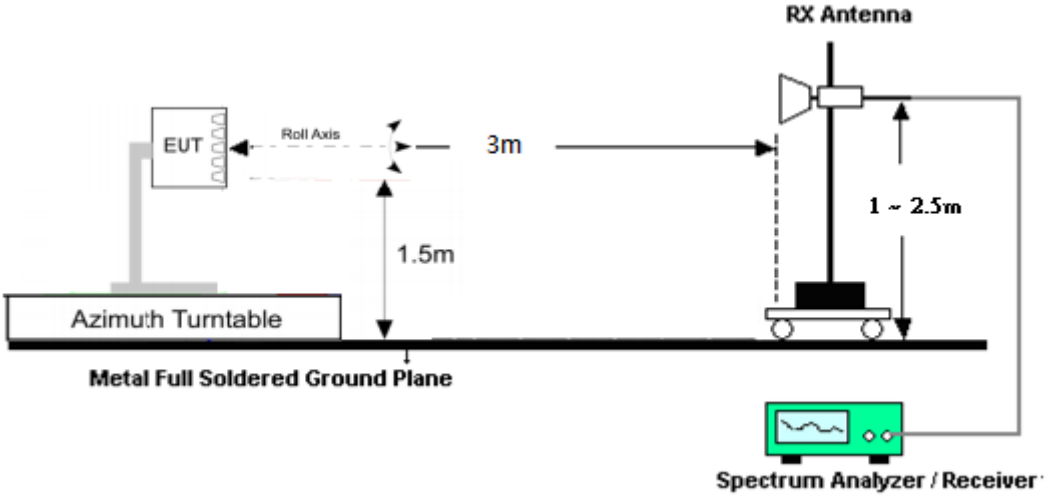
For radiated emissions from 30MHz to 1GHz



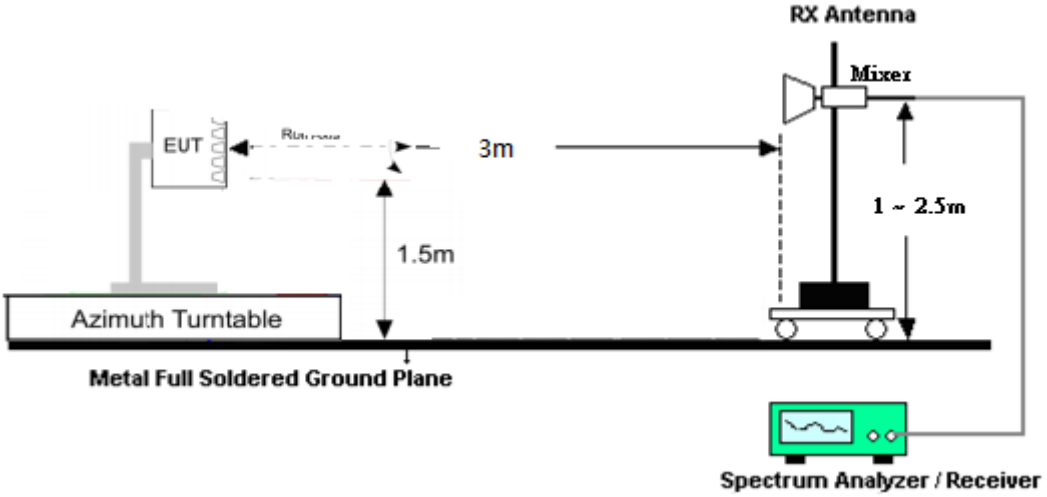
For radiated emissions 1GHz to 18GHz



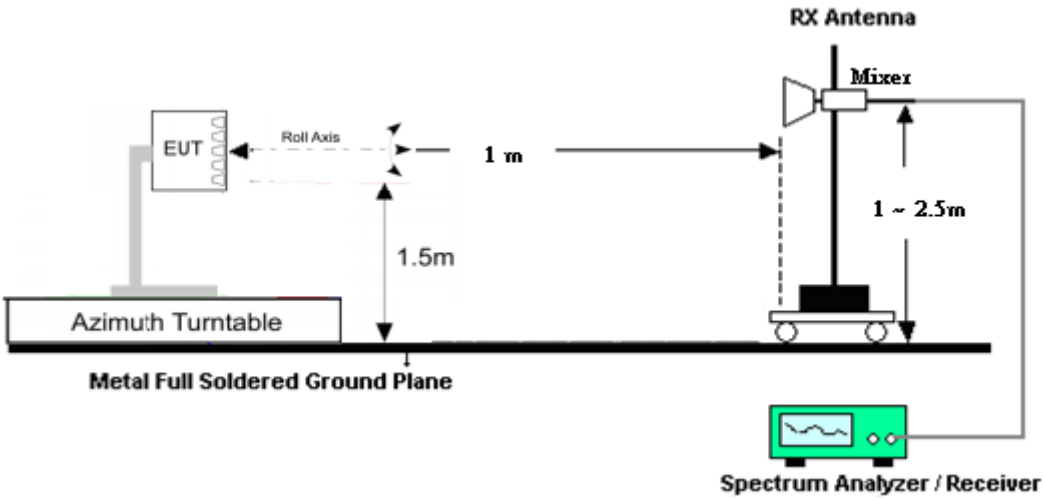
For radiated emissions above 18GHz up to 40GHz



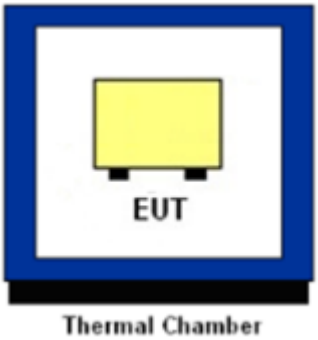
For radiated emissions above 40GHz up to 90GHz



For radiated emissions above 90GHz up to 100GHz



For Frequency Stability



3.3 Test Result of Radiated Test

Please refer to Appendix A and B.

Note: The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.4 EIRP PSD Measurement

3.4.1 Description of EIRP PSD Measurement

For Fixed and Base Stations, the average power of the sum of all antenna elements is limited to a maximum EIRP PSD of +75dBm/100MHz.

3.4.2 Test Procedures

1. Set EUT at maximum output power.
2. Select lowest, middle, and highest channels for each band and different modulation.
3. Enable channel power function of spectrum analyzer
4. Set frequency would like to be investigated.
5. Set Detector = RMS
6. Set Trace mode = trace average
7. Set Sweep time = auto couple
8. Set sweep points ≥ 2 x Span/RBW
9. Set sweep count 100 and wait until the trace to be stabilized
10. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum emission.
11. Total EIRP is measured and recorded from the spectrum analyzer.
12. If the measured total EIRP is less than the EIRP density limit, the device is compliant since the total power is always greater than the partial power.
13. The test result is calculated according to
    ANSI C63.26-2015 Section 5.2.7
    EIRP (dBm) = E(dBuV/m) + 20log (D) -104.8.
    where D is the measurement distance (in the far field region) in m.
    E (dBuV/m) = Spectrum Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 107
    That is, set the spectrum offset including sum of
    Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

3.5 Occupied Bandwidth

3.5.1 Description of Occupied Bandwidth Measurement

This is for reporting only.

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

3.5.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.4.4

1. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be at least 1.5 times the anticipated OBW.
2. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
3. Set the detection mode to peak, and the trace mode to max hold.
4. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.6 Radiated Unwanted Emission Measurement

3.6.1 Description of Radiated Unwanted Emission Measurement

The spectrum is scanned from 30 MHz up to 200GHz.

The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower.

3.6.2 Test Procedures

1. Set EUT at maximum output power.
2. Select lowest, middle, and highest channels for each band and different modulation.
3. Measure and record the power level from the spectrum analyzer.
4. Set frequency would like to be investigated.
5. Set Detector = RMS, Trace mode = trace average, sweep time = auto couple
6. Set sweep points ≥ 2 x Span/RBW, sweep count 100 and wait until the trace to be stabilized.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. For measurement frequency from 30MHz to 18GHz:

   An antenna was substituted in place of the EUT and was driven by a signal generator.
   Tune the output power of signal generator to the same emission level with EUT maximum spurious emission. Take record of output power and repeat for another polarization.
9. For measurement frequency above 18GHz:

   The test result is calculated according to ANSI C63.26-2015 Section 5.2.7 and 5.7.3 and 5.7.4

   EIRP (dBm) = E(dBuV/m) + 20log (D) -104.8.

   where D is the measurement distance (in the far field region) in m.

   E (dBuV/m) = Spectrum Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 107

   That is, set the spectrum offset including sum of

   Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

   If EIRP measurement results exceed the emission limit, then TRP measurement will be used as an alternative method. Test results of TRP measurement are marked as “TRP Measurement”.
10. The conversion loss of RF mixer is also included in conversion loss table of the spectrum analyzer when measurement frequency is above 40GHz.
11. The TRP method refers to the clause 4.4.2.2 of FCC KDB 842590 D01 v01r02.

3.7 Frequency Stability Measurement

3.7.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block.

3.7.2 Test Procedures for Temperature Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.

1. The EUT was set up in the thermal chamber.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.7.3 Test Procedures for Voltage Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.

1. The EUT was placed in a temperature chamber at 20° C.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	00993	18GHz~40GHz	Nov. 19, 2020	May 11, 2021 ~ Jun, 18, 2021	Nov. 18, 2021	Radiation (03CH19-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV3044	101010	10Hz~44GHz	Nov. 25, 2020	May 11, 2021 ~ Jun, 18, 2021	Nov. 24, 2021	Radiation (03CH19HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801607/2	9kHz~40GHz	Dec. 22, 2020	May 11, 2021 ~ Jun, 18, 2021	Dec. 21, 2021	Radiation (03CH19-HY)
Temperature & Humidity Cabinet Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Nov. 10, 2020	May 11, 2021 ~ May 19, 2021	Nov. 09, 2021	Radiation (03CH19-HY)
Turn Table	EMEC	N/A	N/A	Phi/Theta 0~360 Degree	N/A	May 11, 2021 ~ Jun, 18, 2021	N/A	Radiation (03CH19HY)
Controller	EMEC	EM 1000	N/A	Control Turn table	N/A	May 11, 2021 ~ Jun, 18, 2021	N/A	Radiation (03CH19-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	103738	9kHz to 30GHz	May 14, 2020	May 11, 2021	May 13, 2021	Radiation (03CH19-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jul. 14, 2020	May 11, 2021 ~ Jun, 18, 2021	Jul. 13, 2021	Radiation (03CH19-HY)
Harmonic Mixer (*)	Rohde & Schwarz	RPG FS-Z60	101033	40GHz to 60GHz	Mar. 17, 2020	May 11, 2021	Mar. 16, 2023	Radiation (03CH18-HY)
Harmonic Mixer (*)	Rohde & Schwarz	FSZ-90	101811	60GHz to 90GHz	Jul. 16, 2018	May 11, 2021	Jul. 15, 2021	Radiation (03CH18-HY)
Harmonic Mixer (*)	Rohde & Schwarz	RPG FS-Z140	101128	90GHz to 140GHz	Oct. 26, 2020	May 11, 2021	Oct. 25, 2023	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-UPRR00	923600007	40-60 GHz	Aug. 17, 2018	May 11, 2021	Aug. 16, 2021	Radiation (03CH19-HY)
Antenna	Quinstar	QWH-EPRR00	784600034	60-90 GHz	Aug. 17, 2018	May 11, 2021	Aug. 16, 2021	Radiation (03CH19-HY)
Antenna	Quinstar	QWH-FPRR00	923800008	90-140 GHz	Aug. 17, 2018	May 11, 2021	Aug. 16, 2021	Radiation (03CH18-HY)

Note 1: (*) Equipment manufacturer's Calibration Certificate.

Note 2: The Standard Gain Horn Antennas are calibrated by the ISO 17025 accredited test lab MWM Lab (http://en.mwmlab.com/about), a sub unit of Belarussian State University of Informatics and Radio electronics which is accredited by the Belarusian State Centre for Accreditation (BSCA). BSCA is the National accreditation body of the Republic of Belarus and an associated member of the International Laboratory Accreditation Cooperation (ILAC).

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Preamplifier	COM-POWER	PAM-103	18020199	1MHz-1000MHz	Jan. 04, 2021	May 11, 2021 ~ May 19, 2021	Jan. 03, 2022	Radiation (03CH19-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	55608 & 09	30MHz~1GHz	Oct. 22, 2020	May 11, 2021 ~ May 19, 2021	Oct. 21, 2021	Radiation (03CH19-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02294	1GHz~18GHz	Jun. 09, 2020	May 11, 2021 ~ May 19, 2021	Jun. 08, 2021	Radiation (03CH19-HY)
Amplifier	EMCI	EMC118A45SE	980791	1GHz-18GHz	Nov. 16, 2020	May 11, 2021 ~ May 19, 2021	Nov. 15, 2021	Radiation (03CH19-HY)
EMI Test Receicver	Keysight	N9010B	MY60240520	N/A	Dec. 02, 2020	May 11, 2021 ~ May 19, 2021	Dec. 01, 2021	Radiation (03CH19-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	May 11, 2021 ~ May 19, 2021	N/A	Radiation (03CH19-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	May 11, 2021 ~ May 19, 2021	N/A	Radiation (03CH19-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	May 11, 2021 ~ May 19, 2021	N/A	Radiation (03CH19-HY)
Software	Audix	E3 6.2009-8-24	RK-002155	N/A	N/A	May 11, 2021 ~ May 19, 2021	N/A	Radiation (03CH19-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	519226/2,804014/2,804026/2	30MHz~40GHz	Jan. 20, 2021	May 11, 2021 ~ May 19, 2021	Jan. 19, 2022	Radiation (03CH19-HY)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.31 dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.62 dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.03 dB

Uncertainty of Radiated Emission Measurement (40 GHz ~ 140 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.83 dB

Uncertainty of Radiated Emission Measurement (140 GHz ~ 200 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.80 dB

Appendix A. Test Results of EIRP: n261

EIRP Power(Average power)

NR Band n261 (Beam ID: 11+139) Maximum Average EIRP						
Channel	BW [MHz]	Modulation	Total EIRP [dBm]	EIRP PSD [dBm / 100 MHz]	EIRP PSD Limit [dBm / 100 MHz]	Result
Lowest	100	QPSK	49.46	49.46	75	Pass
	200	QPSK	49.50	49.50	75	Pass
	400	QPSK	49.32	49.32	75	Pass
Middle	100	QPSK	49.61	49.61	75	Pass
	200	QPSK	**49.72**	**49.72**	75	Pass
	400	QPSK	49.67	49.67	75	Pass
Highest	100	QPSK	49.42	49.42	75	Pass
	200	QPSK	49.46	49.46	75	Pass
	400	QPSK	49.34	49.34	75	Pass
Lowest	100	16QAM	47.59	47.59	75	Pass
	200	16QAM	47.45	47.45	75	Pass
	400	16QAM	47.28	47.28	75	Pass
Middle	100	16QAM	47.52	47.52	75	Pass
	200	16QAM	47.60	47.60	75	Pass
	400	16QAM	47.53	47.53	75	Pass
Highest	100	16QAM	47.35	47.35	75	Pass
	200	16QAM	47.59	47.59	75	Pass
	400	16QAM	47.32	47.32	75	Pass
Lowest	100	64QAM	45.67	45.67	75	Pass
	200	64QAM	45.48	45.48	75	Pass
	400	64QAM	45.17	45.17	75	Pass
Middle	100	64QAM	45.39	45.39	75	Pass
	200	64QAM	45.73	45.73	75	Pass
	400	64QAM	45.43	45.43	75	Pass
Highest	100	64QAM	45.24	45.24	75	Pass
	200	64QAM	45.46	45.46	75	Pass
	400	64QAM	45.12	45.12	75	Pass

Remark 1: A duty factor of 1.3 dB (74% duty cycle) is added to the measured results.

Remark 2: According to FCC KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 clause 4.2 c), when the channel bandwidth of the signal is greater than100 MHz, the total EIRP is compared to the EIRP PSD limit. The device is compliant since the total power is always greater than the partial power.

NR Band n261 (Beam ID: 12) Maximum Average EIRP						
Channel	BW [MHz]	Modulation	Total EIRP [dBm]	EIRP PSD [dBm / 100 MHz]	EIRP PSD Limit [dBm / 100 MHz]	Result
Lowest	100	QPSK	46.97	46.97	75	Pass
	200	QPSK	46.25	46.25	75	Pass
	400	QPSK	46.43	46.43	75	Pass
Middle	100	QPSK	46.60	46.60	75	Pass
	200	QPSK	46.36	46.36	75	Pass
	400	QPSK	46.44	46.44	75	Pass
Highest	100	QPSK	46.22	46.22	75	Pass
	200	QPSK	46.40	46.40	75	Pass
	400	QPSK	46.41	46.41	75	Pass

Remark 1: A duty factor of 1.3 dB (74% duty cycle) is added to the measured results.

Remark 2: According to FCC KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 clause 4.2 c), when the channel bandwidth of the signal is greater than100 MHz, the total EIRP is compared to the EIRP PSD limit. The device is compliant since the total power is always greater than the partial power.

NR Band n261 (Beam ID: 139) Maximum Average EIRP						
Channel	BW [MHz]	Modulation	Total EIRP [dBm]	EIRP PSD [dBm / 100 MHz]	EIRP PSD Limit [dBm / 100 MHz]	Result
Lowest	100	QPSK	46.95	46.95	75	Pass
	200	QPSK	47.04	47.04	75	Pass
	400	QPSK	47.28	47.28	75	Pass
Middle	100	QPSK	47.20	47.20	75	Pass
	200	QPSK	46.90	46.90	75	Pass
	400	QPSK	46.81	46.81	75	Pass
Highest	100	QPSK	47.29	47.29	75	Pass
	200	QPSK	47.38	47.38	75	Pass
	400	QPSK	47.24	47.24	75	Pass

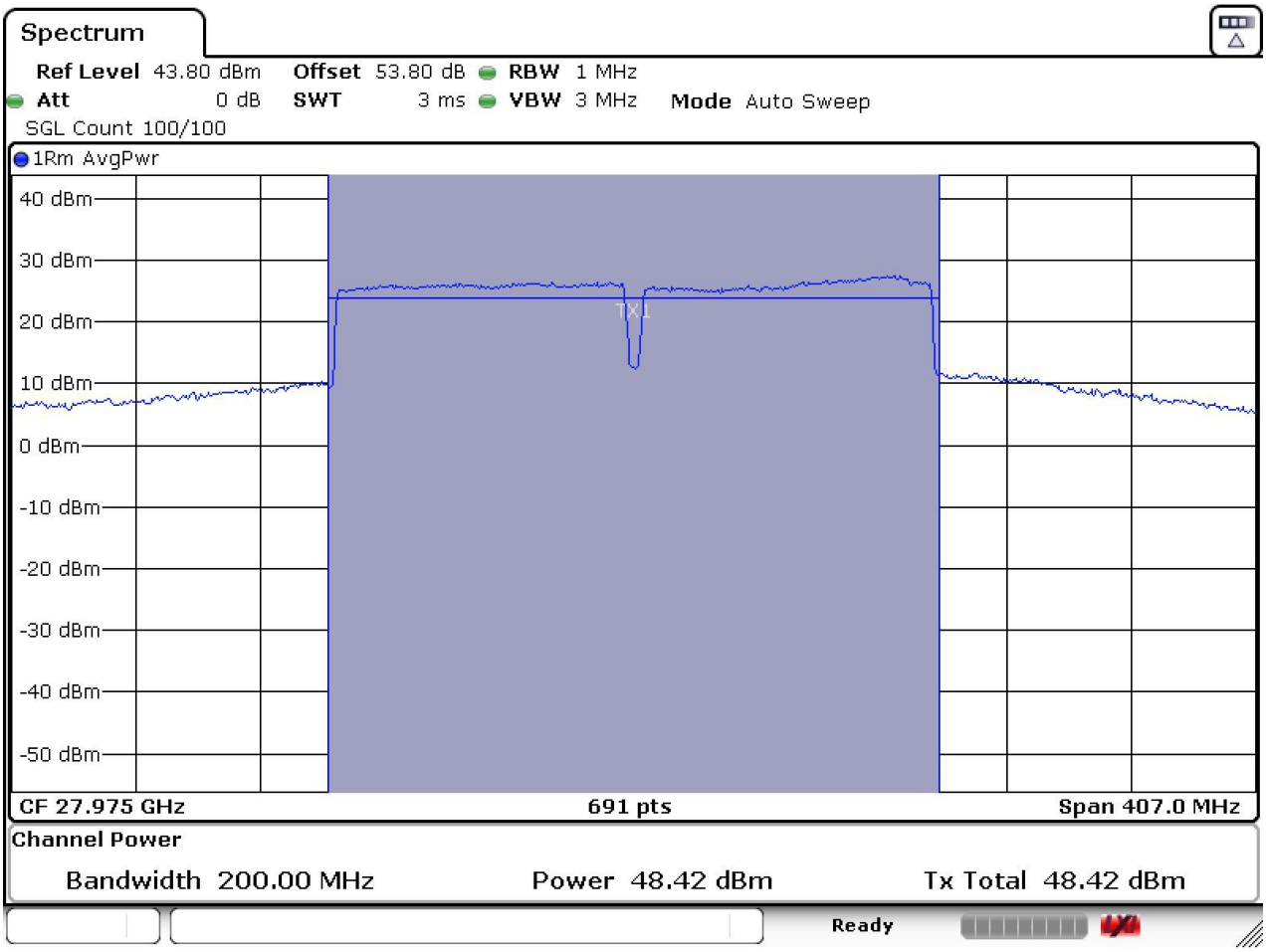
Remark 1: A duty factor of 1.3 dB (74% duty cycle) is added to the measured results.

Remark 2: According to FCC KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 clause 4.2 c), when the channel bandwidth of the signal is greater than100 MHz, the total EIRP is compared to the EIRP PSD limit. The device is compliant since the total power is always greater than the partial power.

NR Band n261

EIRP Worst Case Plot

Middle Channel / 200MHz / QPSK (Beam ID: 11+139)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 39.4 + 2.65 + 107 + 20log(3) – 104.8 = 53.8 (dB)

A duty factor of 1.3 dB (74% duty cycle) will be added to the measured result as below:

Final Result = Measured Result + Duty Factor = 48.42 + 1.3 = 49.72

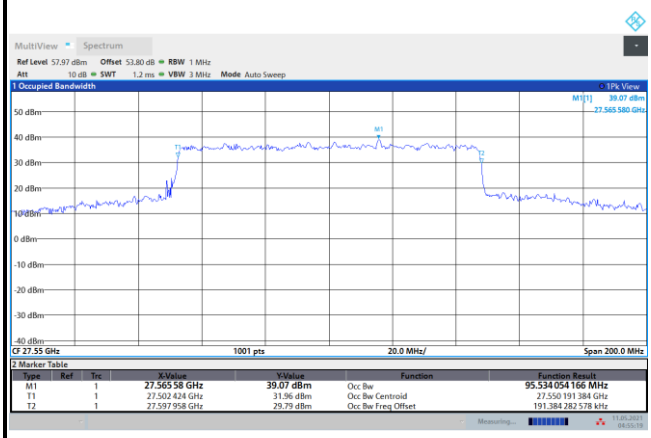
Appendix B.1 Radiated Test: NR Band n261 (Beam ID: 11+139)

Occupied Bandwidth

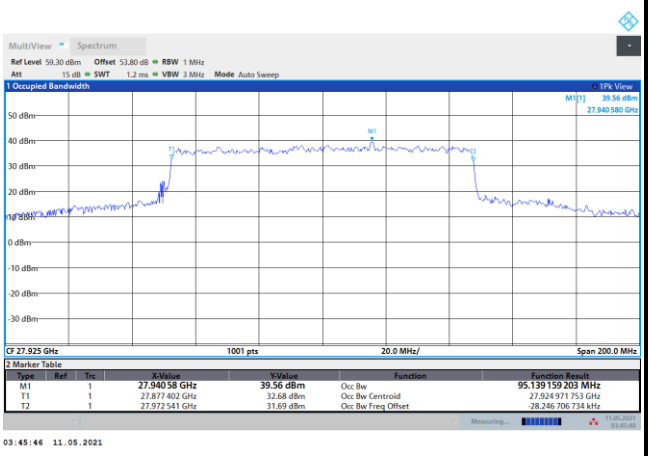
Mode	NR Band n261 : 99%OBW(MHz)		
BW	100MHz	200MHz	400MHz
Mod.	QPSK	QPSK	QPSK
Lowest CH	95.53	195.00	393.36
Middle CH	95.13	194.25	393.38
Highest CH	94.53	194.16	398.53
Mod.	16QAM	16QAM	16QAM
Middle CH	91.49	190.57	389.02
Mod.	64QAM	64QAM	64QAM
Middle CH	91.69	190.50	388.45

NR Band n261

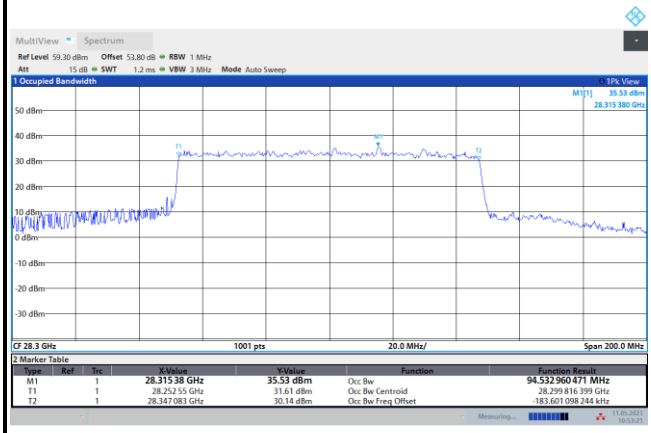
Lowest Channel / 100MHz / QPSK



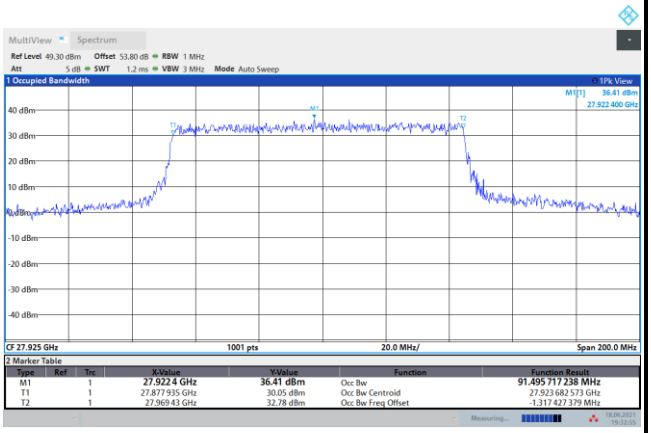
Middle Channel / 100MHz / QPSK



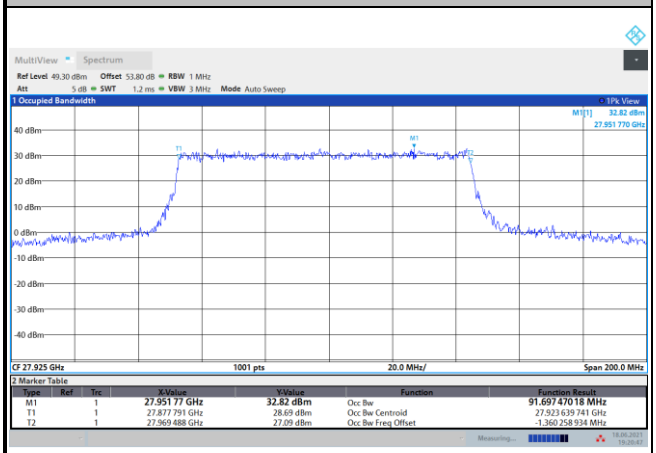
Highest Channel / 100MHz / QPSK



Middle Channel / 100MHz / 16QAM

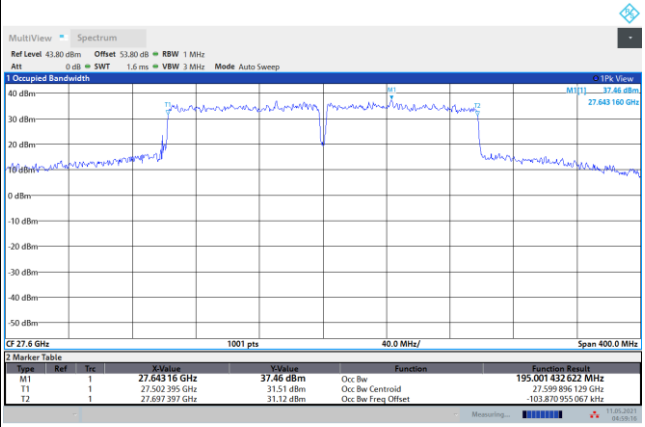


Middle Channel / 100MHz / 64QAM

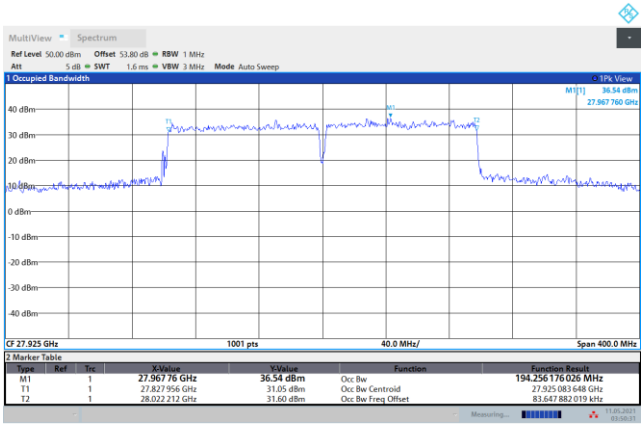


NR Band n261

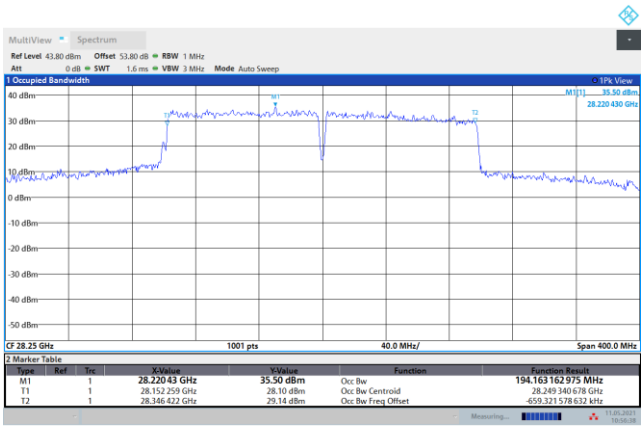
Lowest Channel / 200MHz / QPSK



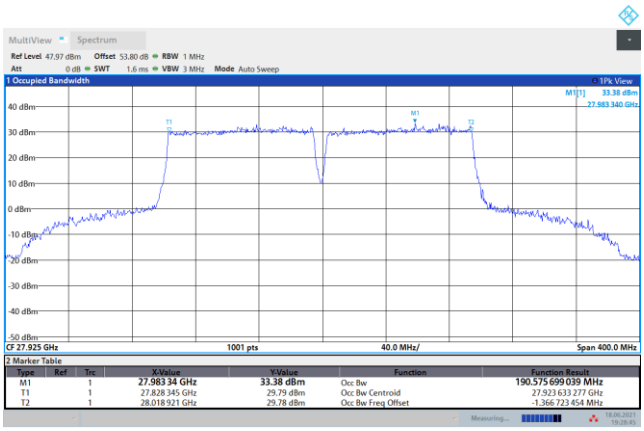
Middle Channel / 200MHz / QPSK



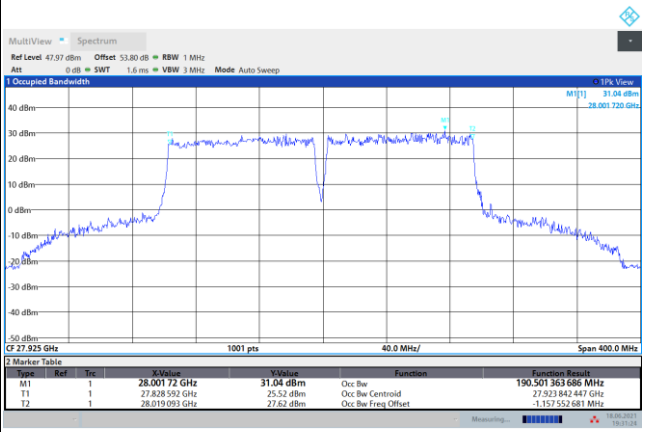
Highest Channel / 200MHz / QPSK



Middle Channel / 200MHz / 16QAM

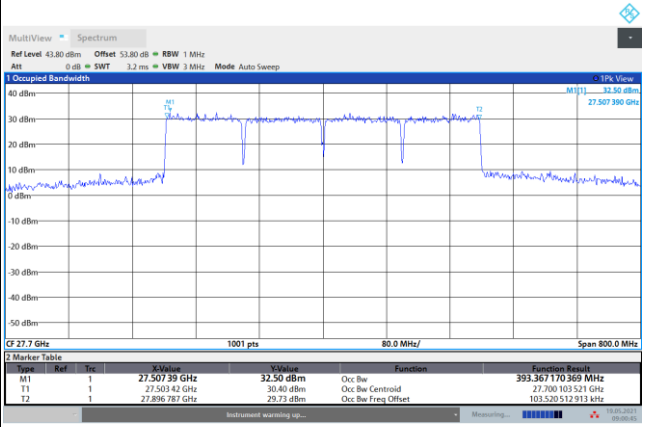


Middle Channel / 200MHz / 64QAM

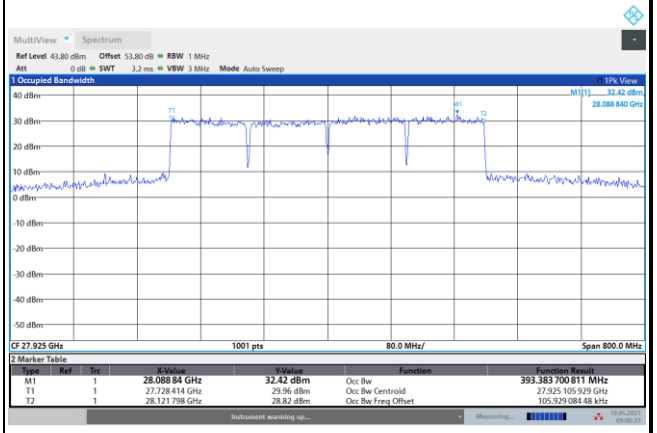


NR Band n261

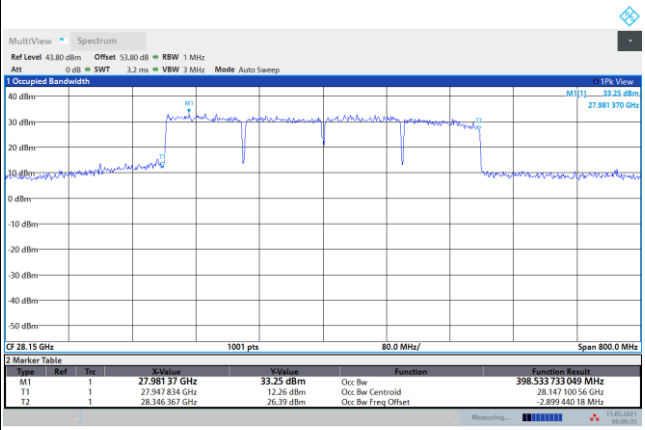
Lowest Channel / 400MHz / QPSK



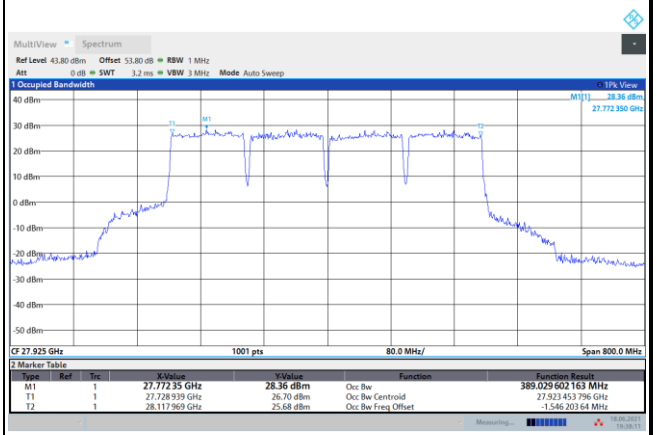
Middle Channel / 400MHz / QPSK



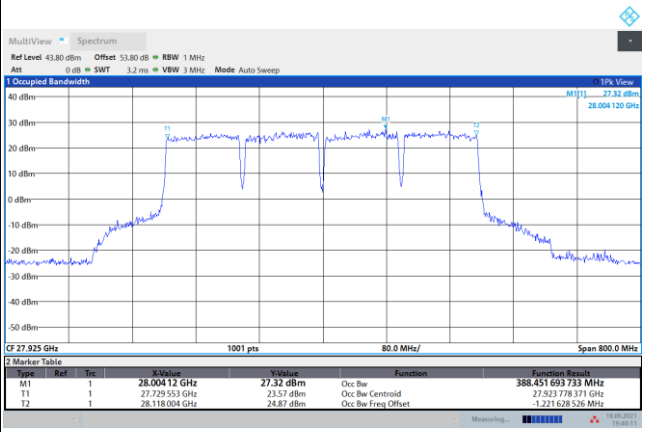
Highest Channel / 400MHz / QPSK



Middle Channel / 400MHz / 16QAM



Middle Channel / 400MHz / 64QAM



Radiated Out of Band Emissions

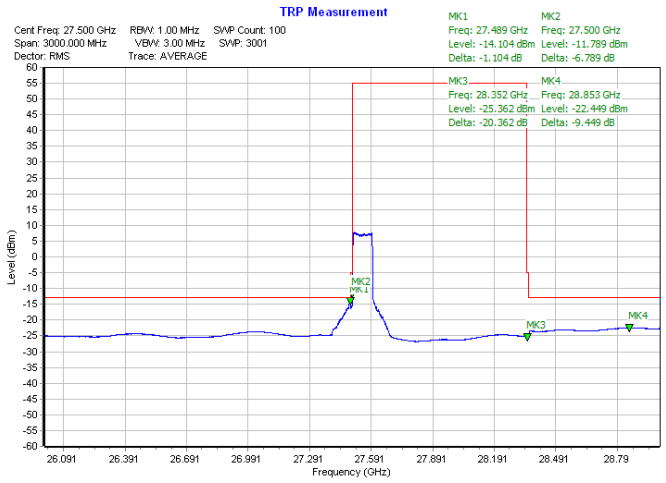
Test Result:

Mode		NR Band n261						
Channel	BW (MHz)	Modulation	0 ~ 10 %OB Limit (dBm/MHz)	0 ~ 10 %OB PSD (dBm/MHz)	Result	>10%OB Limit (dBm/MHz)	>10%OB PSD (dBm/MHz)	Result
Low	100	QPSK	-5	-11.78	Pass	-13	-14.10	Pass
Low	200	QPSK	-5	-11.03	Pass	-13	-13.55	Pass
Low	400	QPSK	-5	-16.33	Pass	-13	-15.66	Pass
Mid	100	QPSK	-5	-20.30	Pass	-13	-22.37	Pass
Mid	200	QPSK	-5	-19.93	Pass	-13	-22.35	Pass
Mid	400	QPSK	-5	-19.00	Pass	-13	-22.37	Pass
High	100	QPSK	-5	-17.82	Pass	-13	-17.48	Pass
High	200	QPSK	-5	-18.43	Pass	-13	-17.48	Pass
High	400	QPSK	-5	-14.66	Pass	-13	-13.27	Pass

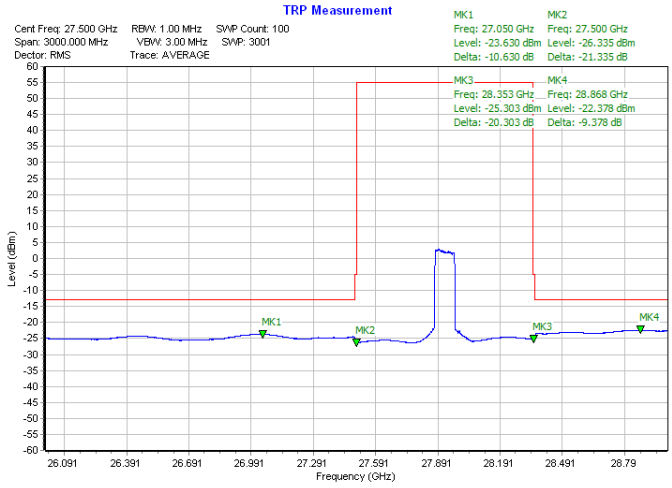
Remark: A duty factor of 1.3 dB (74% duty cycle) is added to the offset during the TRP Measurement.

NR Band n261 / 100MHz / QPSK

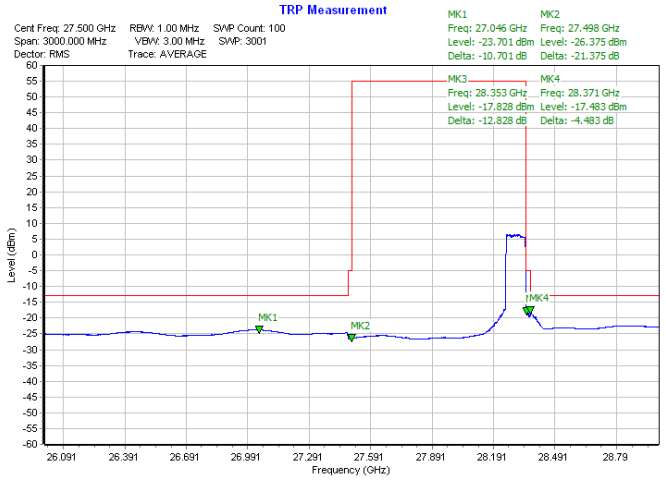
Lowest Band Edge



Middle Band Edge

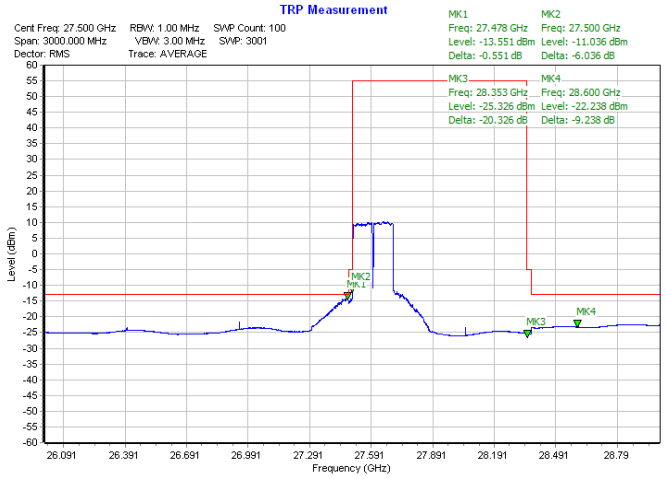


Highest Band Edge

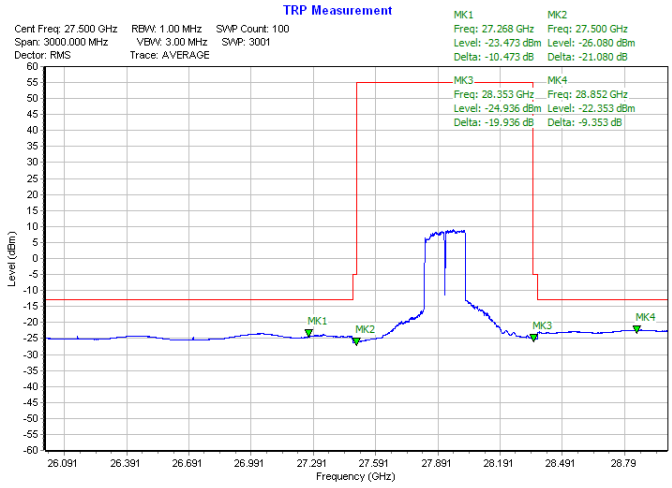


NR Band n261 / 200MHz / QPSK

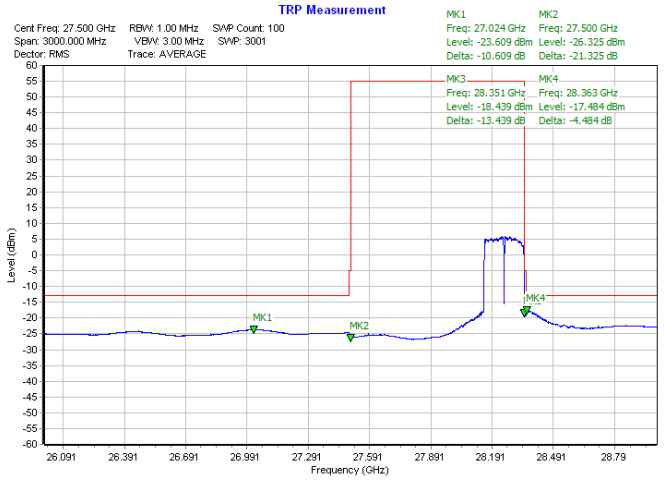
Lowest Band Edge



Middle Band Edge

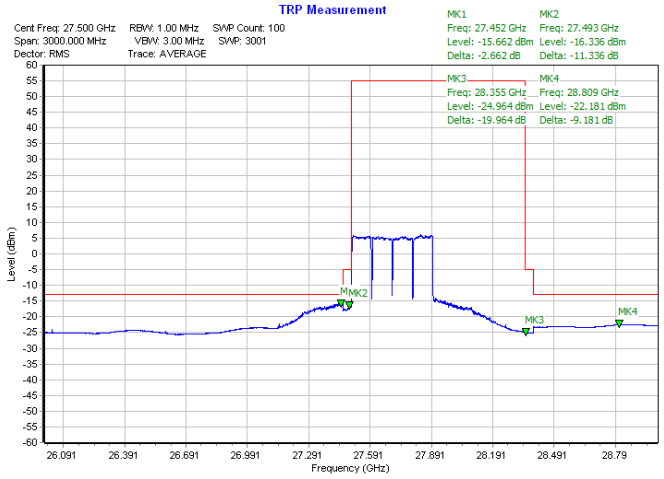


Highest Band Edge

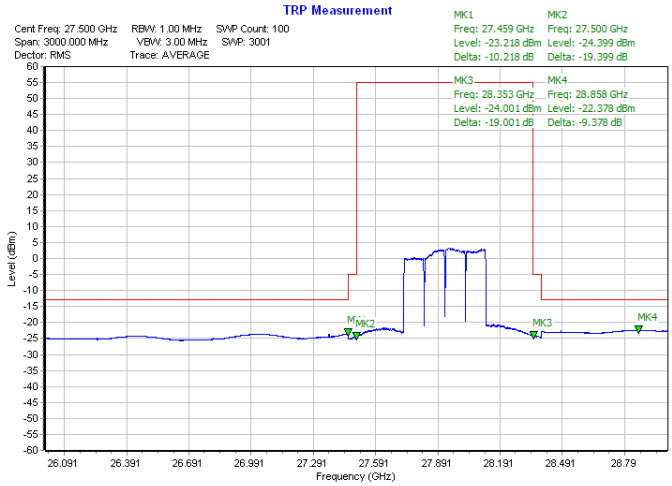


NR Band n261 / 400MHz / QPSK

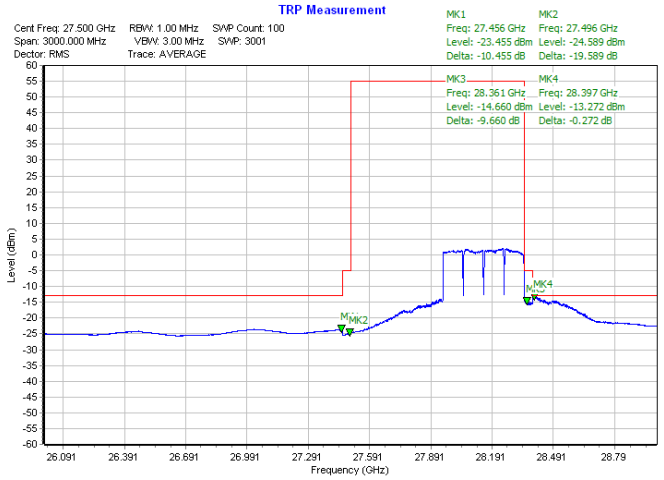
Lowest Band Edge



Middle Band Edge



Highest Band Edge



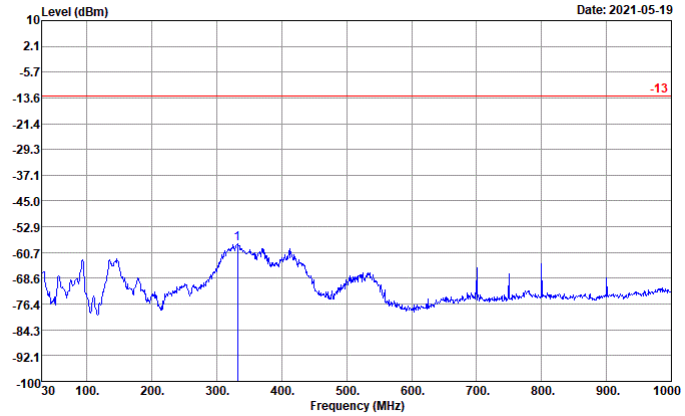
Spurious Emission

There is no significant spurious emission signal found for frequency started from 30MHz up to 18GHz.

Only the noise floor is reported.

NR Band n261 (30MHz-1GHz)

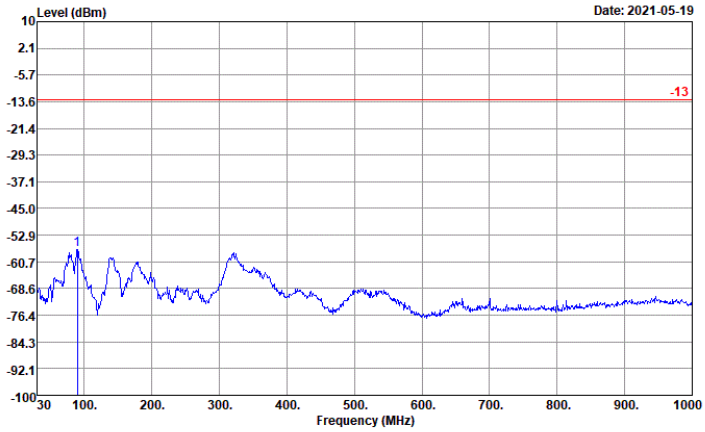
Horizontal



Site : 03CH19-HY
Condition : -13 ERP EIRP_20210305 HORIZONTAL
Project : 142801

	Freq	Level	Over Limit	Limit Line
	MHz	dBm	dB	dBm
1	331.67	-57.97	-44.97	-13.00

Vertical

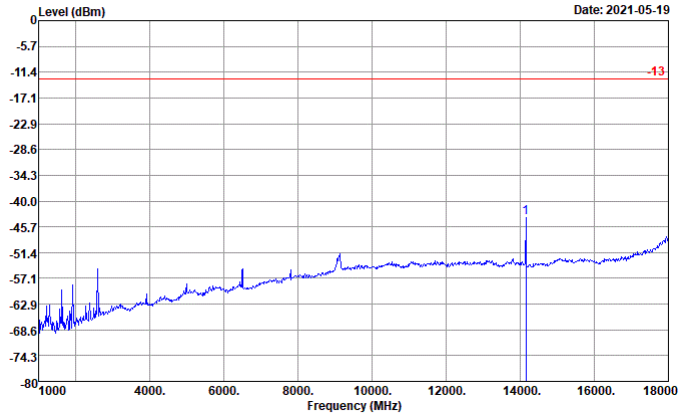


Site : 03CH19-HY
Condition : -13 ERP EIRP_20210305 VERTICAL
Project : 142801

	Freq	Level	Over Limit	Limit Line
	MHz	dBm	dB	dBm
1	90.14	-57.07	-44.07	-13.00

NR Band n261 (1GHz-18GHz)

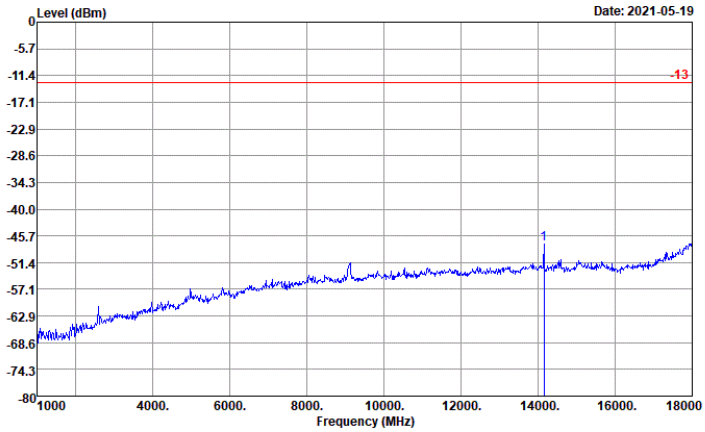
Horizontal



Site : 03CH19-HY
Condition : -13 ERP EIRP_20210305 HORIZONTAL
Project : 142801

	Freq	Level	Over Limit	Limit Line
	MHz	dBm	dB	dBm
1	14158.00	-43.67	-30.67	-13.00

Vertical



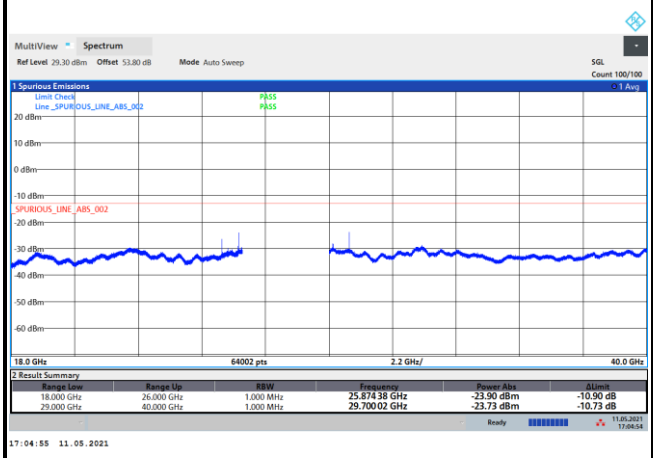
Site : 03CH19-HY
Condition : -13 ERP EIRP_20210305 VERTICAL
Project : 142801

	Freq	Level	Over Limit	Limit Line
	MHz	dBm	dB	dBm
1	14158.00	-47.36	-34.36	-13.00

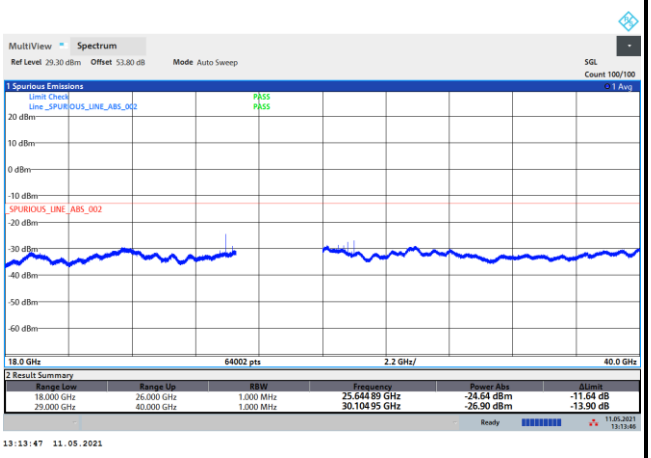
Spurious emission between 18GHz to 40GHz worst case plot is reported as following.

NR Band n261 QPSK (18-40GHz)

Lowest Channel / 100MHz

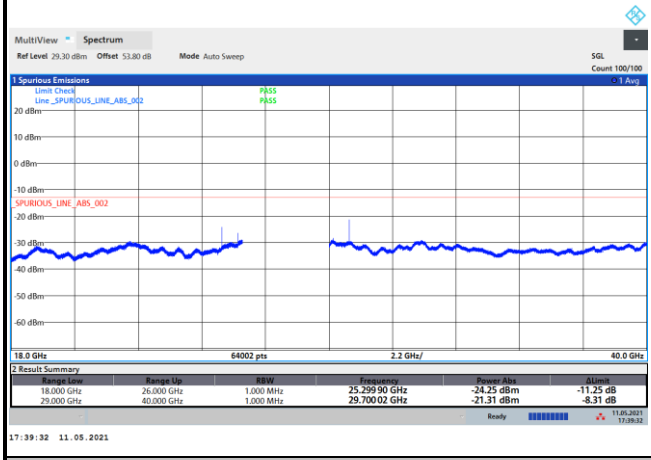
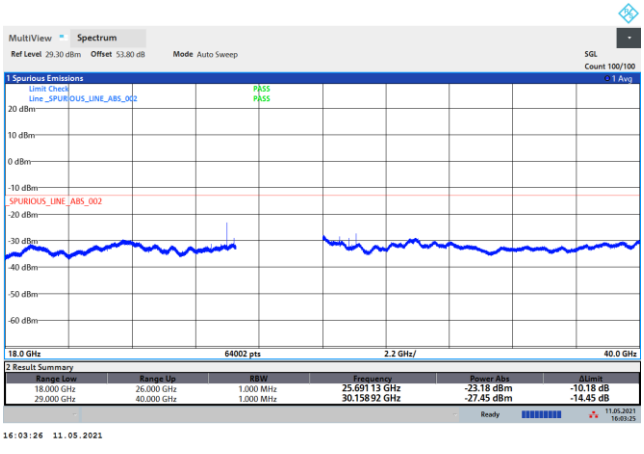


Middle Channel / 100MHz

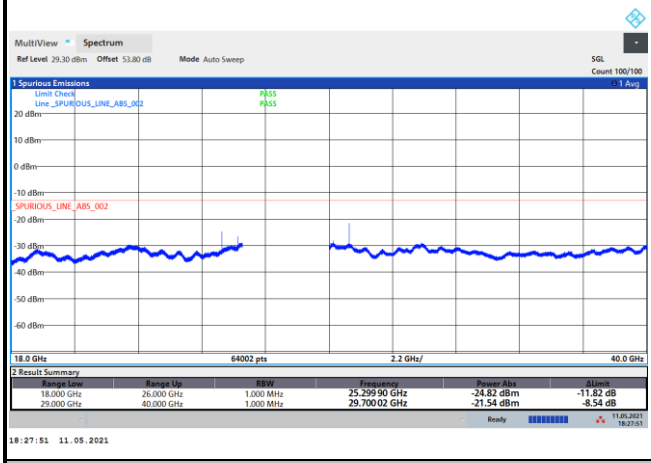
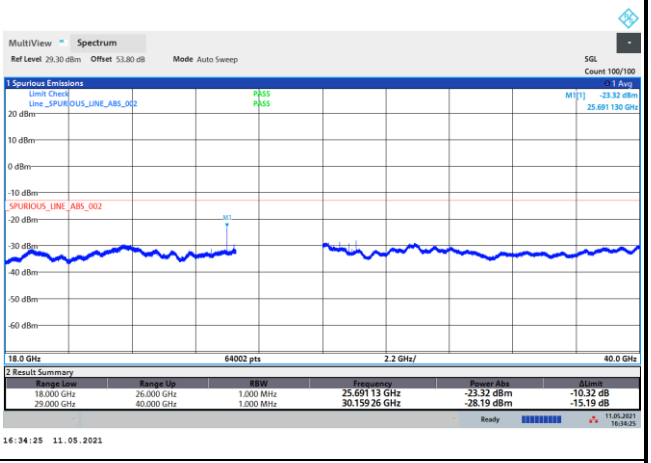
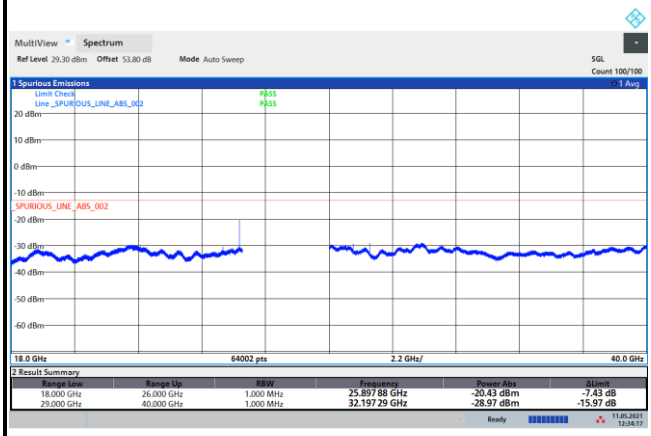


Highest Channel / 100MHz

Remark: Above plots, the spurious emissions were measured from 18GHz to 26GHz and 29GHz to 40GHz. The test results within the omitted frequency 26GHz to 29GHz were measured and reported in the section of Radiated Out of Band Emission with frequency range, 26GHz to 29GHz, and all spurious comply with limits.

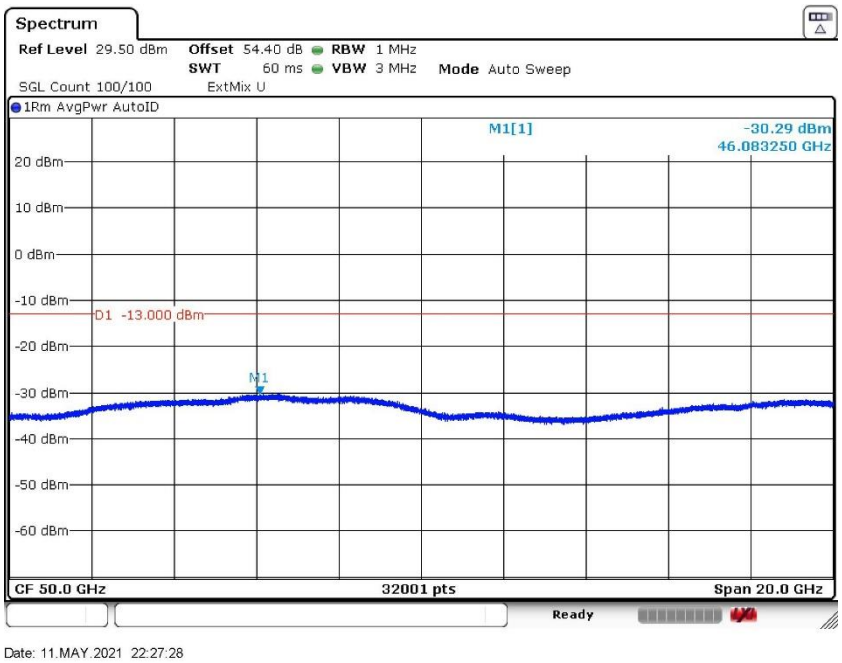
NR Band n261 QPSK (18-40GHz)	
Lowest Channel / 200MHz	**Middle Channel / 200MHz**
	
Highest Channel / 200MHz	

Remark: Above plots, the spurious emissions were measured from 18GHz to 26GHz and 29GHz to 40GHz. The test results within the omitted frequency 26GHz to 29GHz were measured and reported in the section of Radiated Out of Band Emission with frequency range, 26GHz to 29GHz, and all spurious comply with limits.

NR Band n261 QPSK (18-40GHz)	
Lowest Channel / 400MHz	**Middle Channel / 400MHz**
	
Highest Channel / 400MHz	
	

Remark: Above plots, the spurious emissions were measured from 18GHz to 26GHz and 29GHz to 40GHz. The test results within the omitted frequency 26GHz to 29GHz were measured and reported in the section of Radiated Out of Band Emission with frequency range, 26GHz to 29GHz, and all spurious comply with limits.

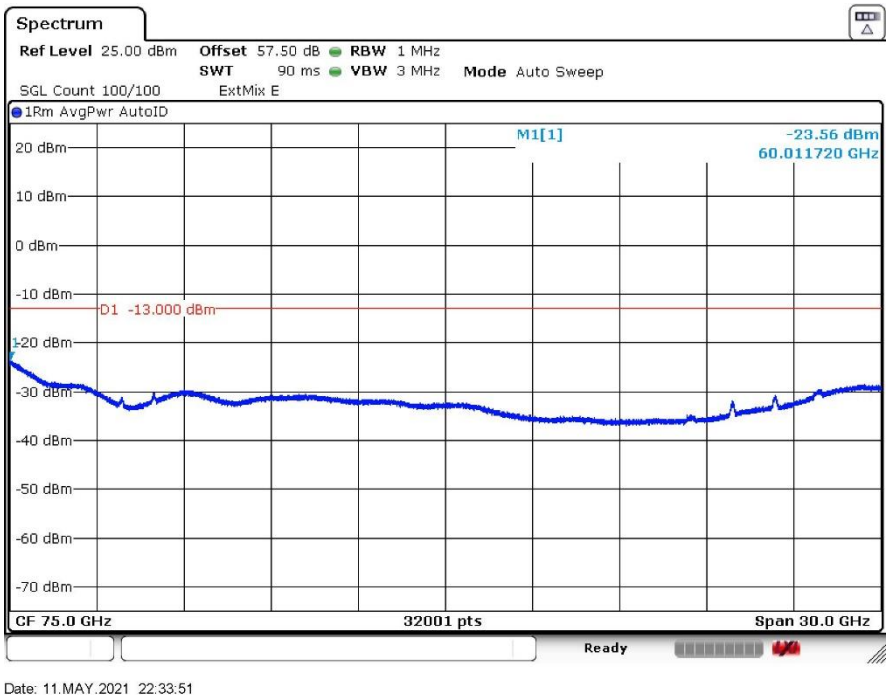
NR Band n261
(40GHz-60GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 42.3 + 0.34 + 107 + 20log(3) – 104.8 = 54.4 (dB)

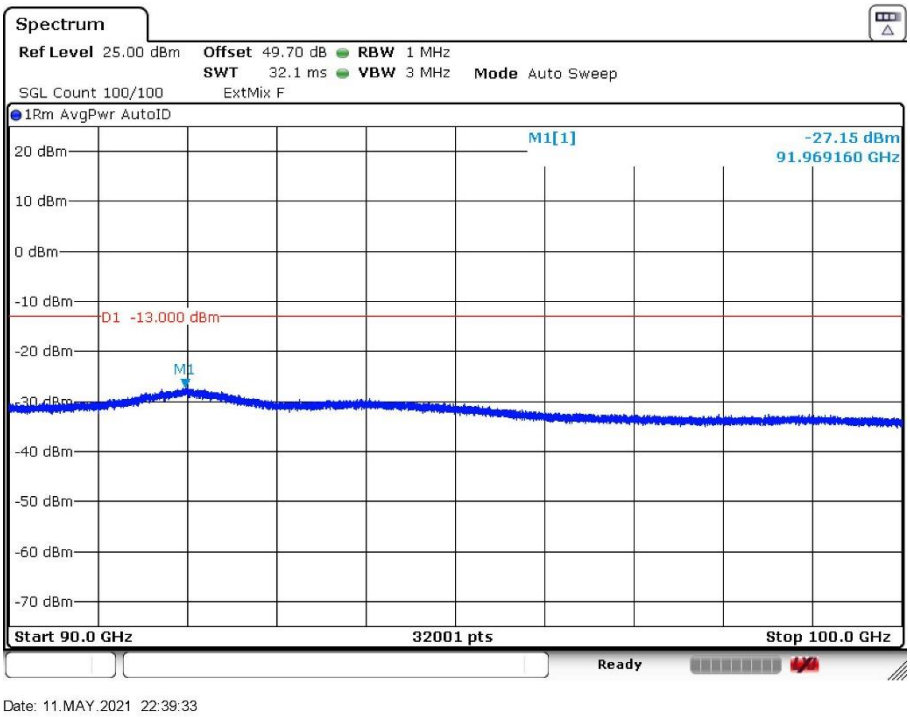
NR Band n261
(60GHz-90GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 45.4 + 0.34 + 107 + 20log(3) – 104.8 = 57.5 (dB)

NR Band n261
(90GHz-100GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 47.2 + 0.34 + 107 + 20log(1) – 104.8 = 49.7 (dB)

Frequency Stability

Test Conditions		NR Band n261 / Middle Channel			Limit
Temperature (°C)	Voltage (Volt)	CW tone			Note.
		Frequency (GHz)	Deviation (kHz)	Deviation (ppm)	Result
50	120	27.9248492	-4.000	0.143	PASS
40	120	27.9248462	-1.000	0.036	
30	120	27.9248452	0.000	0.000	
20(Ref.)	120	27.9248452	0.000	0.000	
10	120	27.9248462	-1.000	0.036	
0	120	27.9248482	-3.000	0.107	
-10	120	27.9248472	-2.000	0.072	
-20	120	27.9248442	1.000	0.036	
-30	120	27.9248442	1.000	0.036	
20	102	27.9248462	-1.000	0.036	
20	120	27.9248462	-1.000	0.036	
20	138	27.9248472	-2.000	0.072	

Note: The frequency fundamental emissions stay within the operation band.

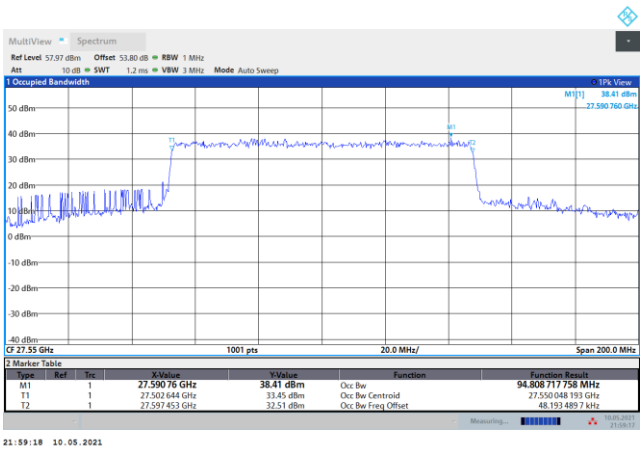
Appendix B.2 Radiated Test: NR Band n261 (Beam ID: 12)

Occupied Bandwidth

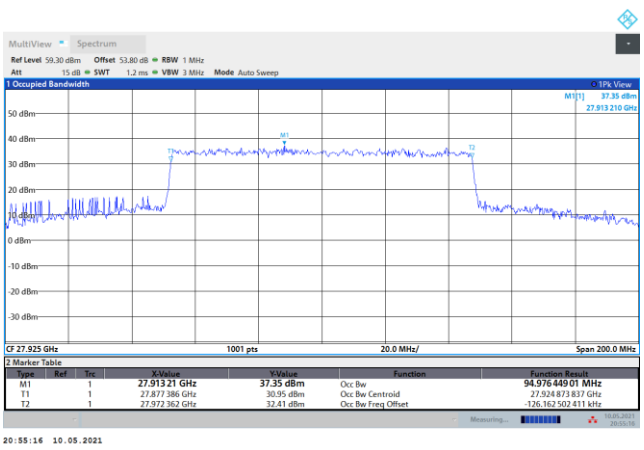
Mode	NR Band n261 : 99%OBW(MHz)		
BW	100MHz	200MHz	400MHz
Mod.	QPSK	QPSK	QPSK
Lowest CH	94.80	193.58	393.30
Middle CH	94.97	193.50	391.55
Highest CH	94.75	193.33	391.83

NR Band n261

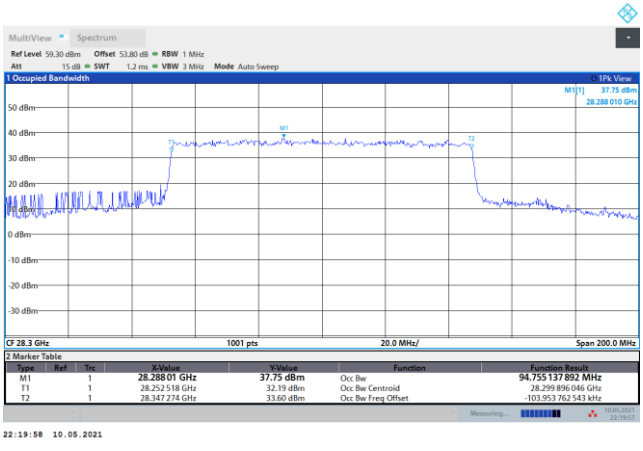
Lowest Channel / 100MHz / QPSK



Middle Channel / 100MHz / QPSK

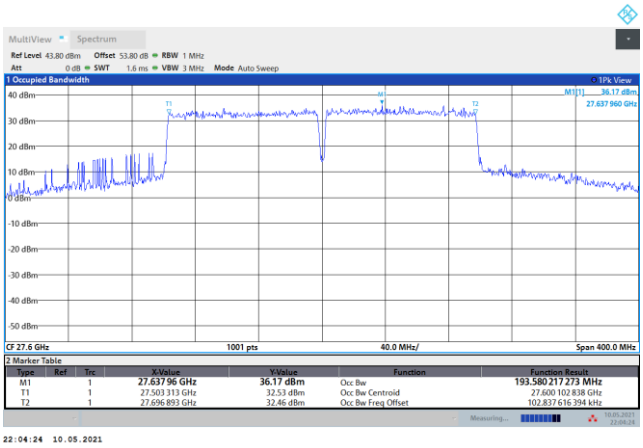


Highest Channel / 100MHz / QPSK

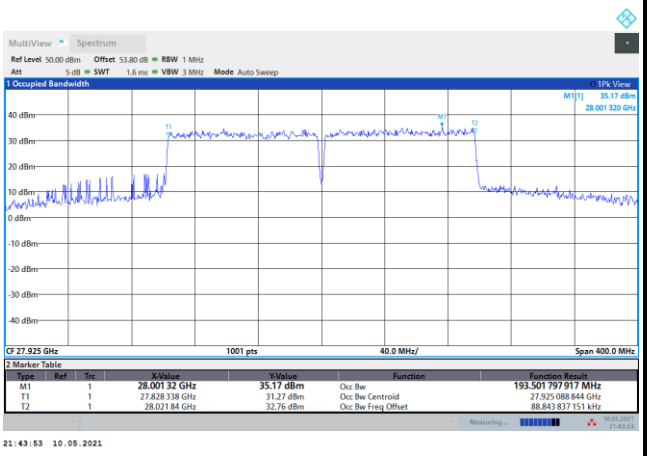


NR Band n261

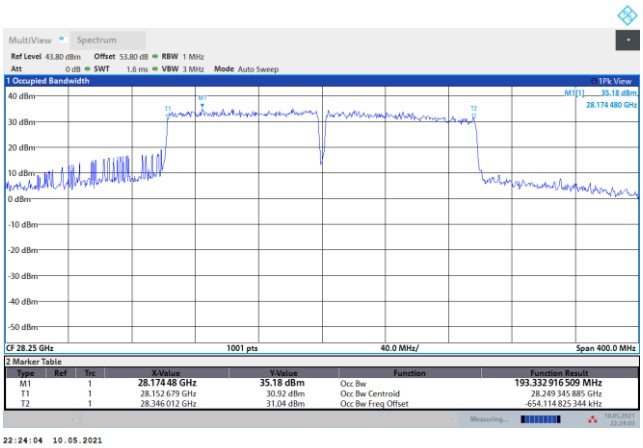
Lowest Channel / 200MHz / QPSK



Middle Channel / 200MHz / QPSK

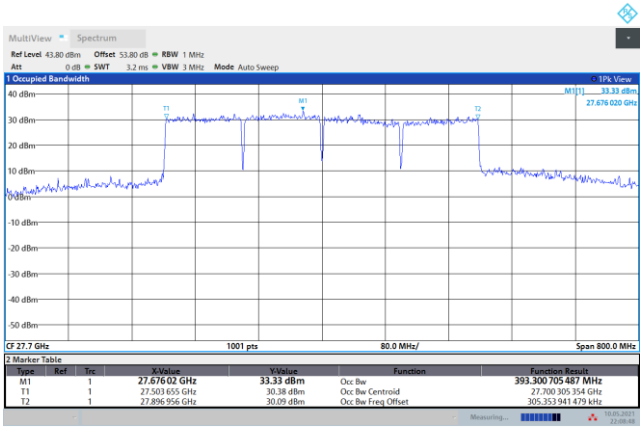


Highest Channel / 200MHz / QPSK

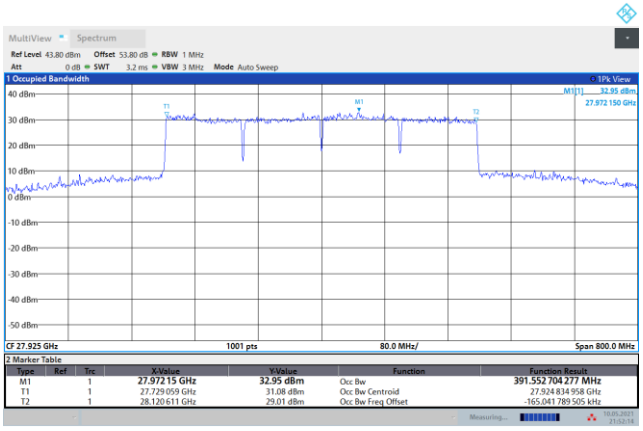


NR Band n261

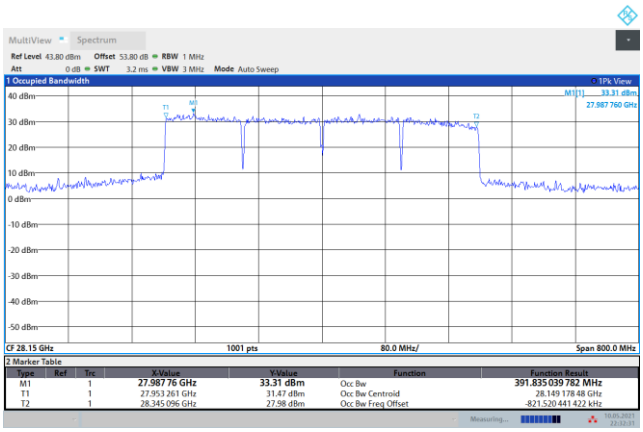
Lowest Channel / 400MHz / QPSK



Middle Channel / 400MHz / QPSK



Highest Channel / 400MHz / QPSK



Radiated Out of Band Emissions

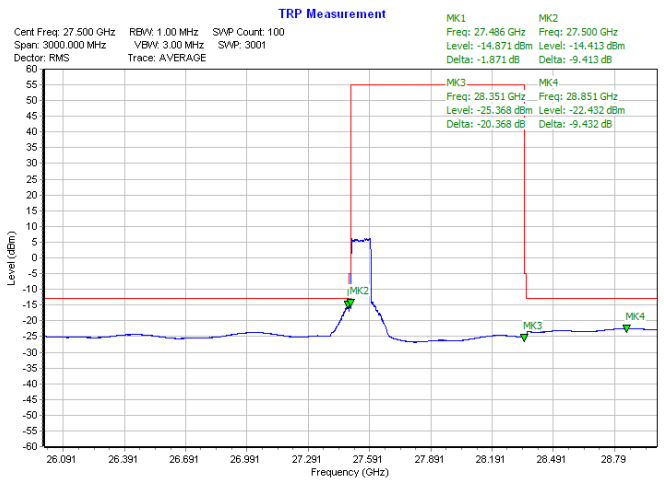
Test Result:

Mode		NR Band n261						
Channel	BW (MHz)	Modulation	0 ~ 10 %OB Limit (dBm/MHz)	0 ~ 10 %OB PSD (dBm/MHz)	Result	>10%OB Limit (dBm/MHz)	>10%OB PSD (dBm/MHz)	Result
Low	100	QPSK	-5	-14.41	Pass	-13	-14.87	Pass
Low	200	QPSK	-5	-22.29	Pass	-13	-22.78	Pass
Low	400	QPSK	-5	-22.80	Pass	-13	-21.99	Pass
Mid	100	QPSK	-5	-20.29	Pass	-13	-22.39	Pass
Mid	200	QPSK	-5	-19.92	Pass	-13	-22.35	Pass
Mid	400	QPSK	-5	-18.37	Pass	-13	-22.12	Pass
High	100	QPSK	-5	-19.14	Pass	-13	-18.27	Pass
High	200	QPSK	-5	-16.03	Pass	-13	-15.03	Pass
High	400	QPSK	-5	-19.95	Pass	-13	-18.41	Pass

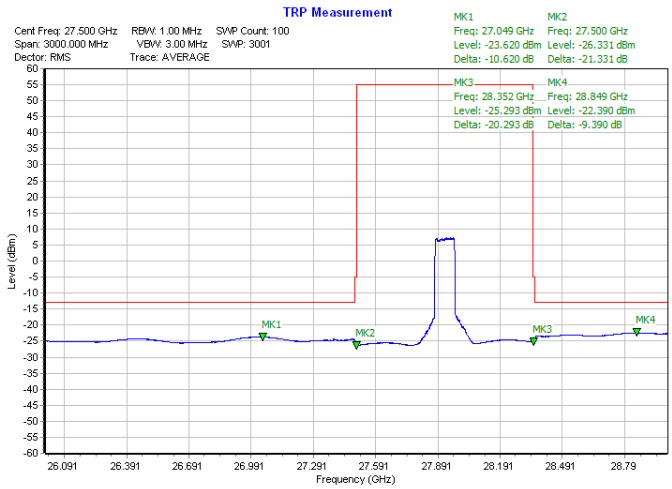
Remark: A duty factor of 1.3 dB (74% duty cycle) is added to the offset during the TRP Measurement.

NR Band n261 / 100MHz / QPSK

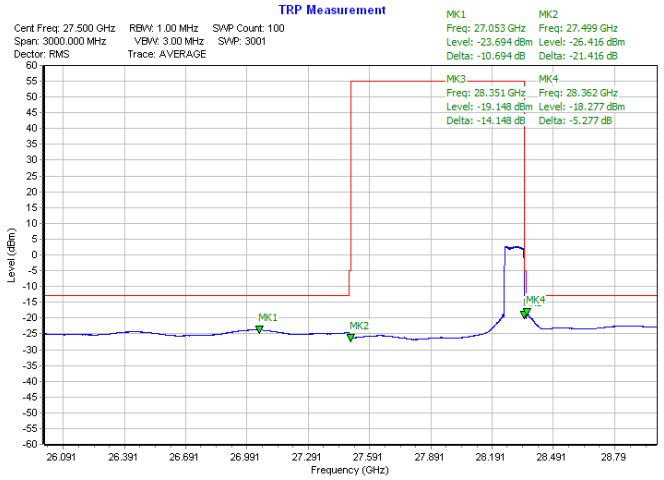
Lowest Band Edge



Middle Band Edge

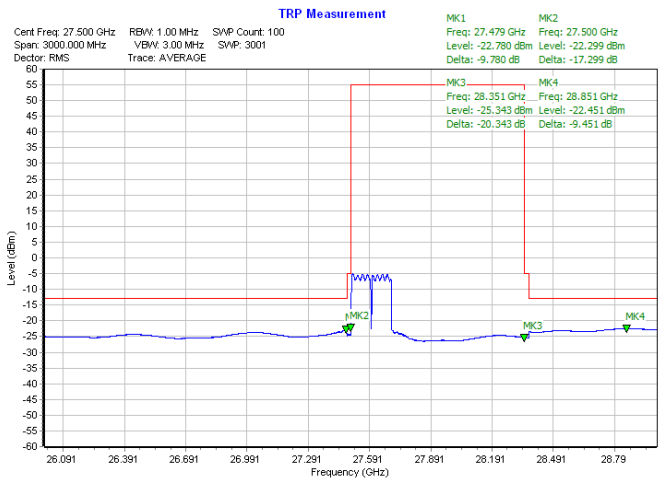


Highest Band Edge

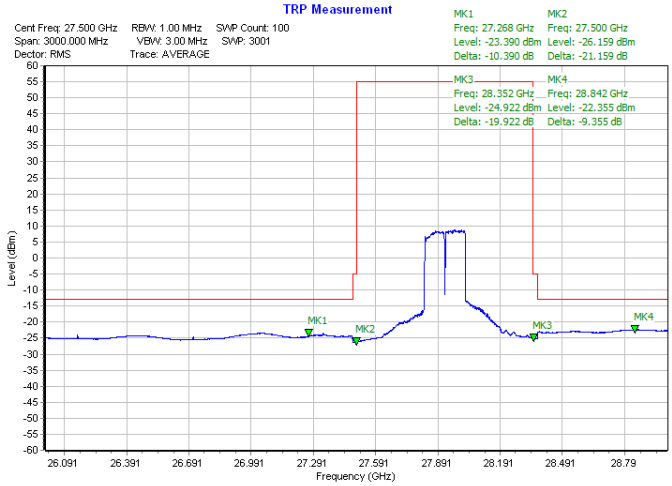


NR Band n261 / 200MHz / QPSK

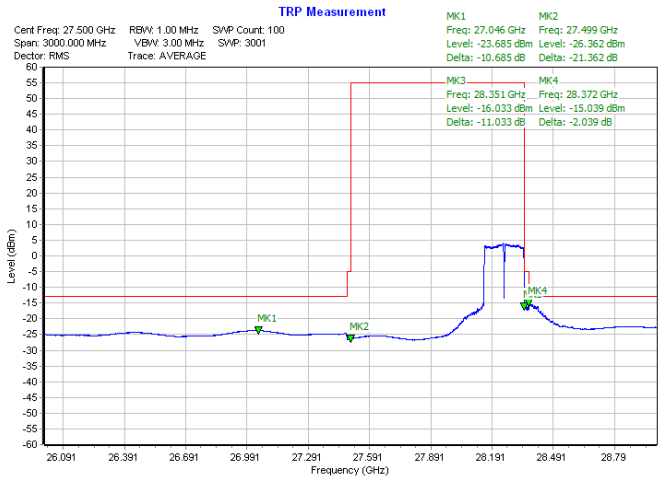
Lowest Band Edge



Middle Band Edge

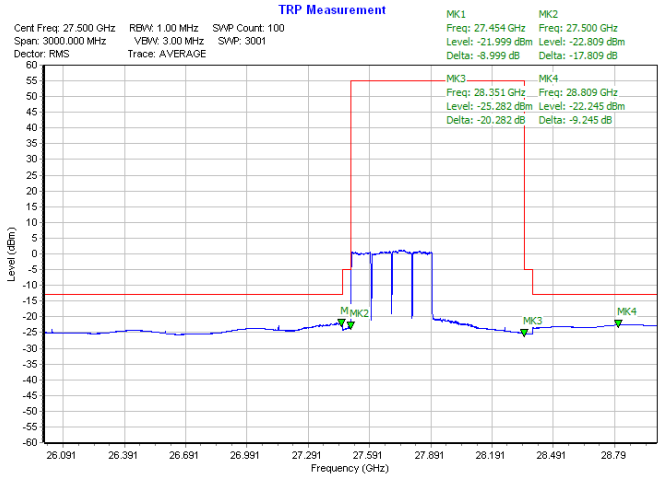


Highest Band Edge

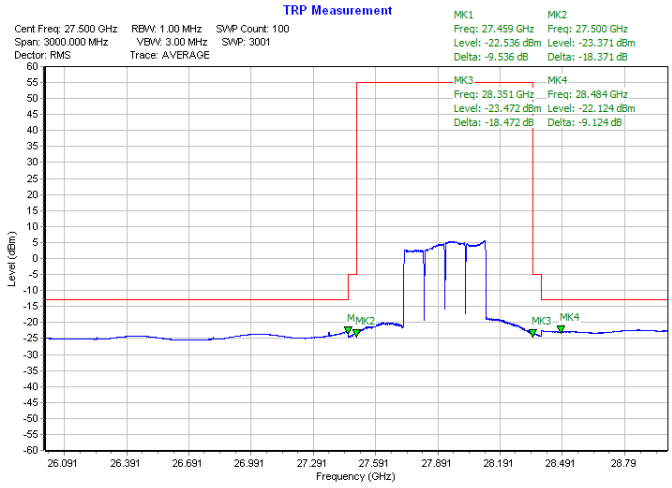


NR Band n261 / 400MHz / QPSK

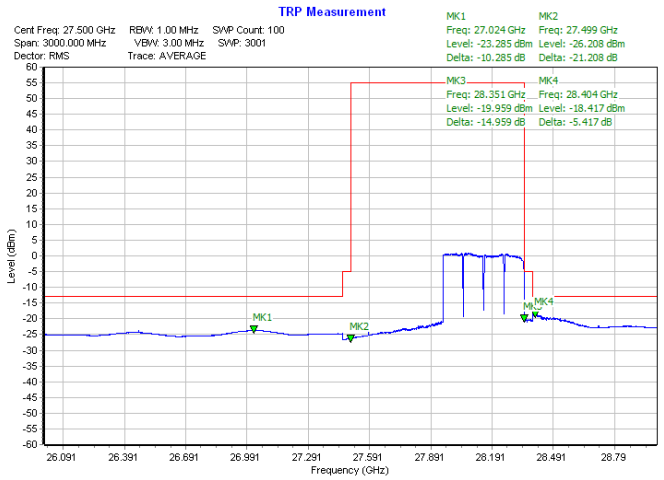
Lowest Band Edge



Middle Band Edge



Highest Band Edge



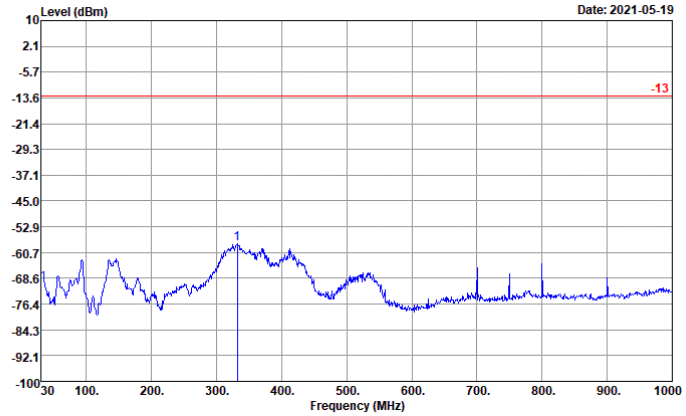
Spurious Emission

There is no significant spurious emission signal found for frequency started from 30MHz up to 18GHz.

Only the noise floor is reported.

NR Band n261 (30MHz-1GHz)

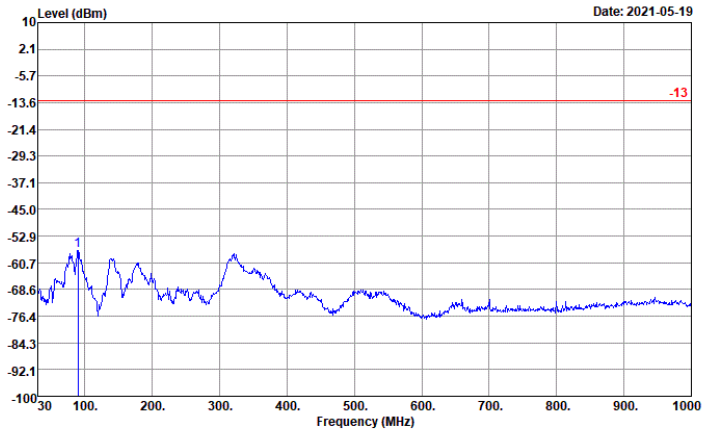
Horizontal



Site : 03CH19-HY
Condition : -13 ERP EIRP_20210305 HORIZONTAL
Project : 142801

	Freq	Level	Over Limit	Limit Line
	MHz	dBm	dB	dBm
1	331.67	-57.97	-44.97	-13.00

Vertical

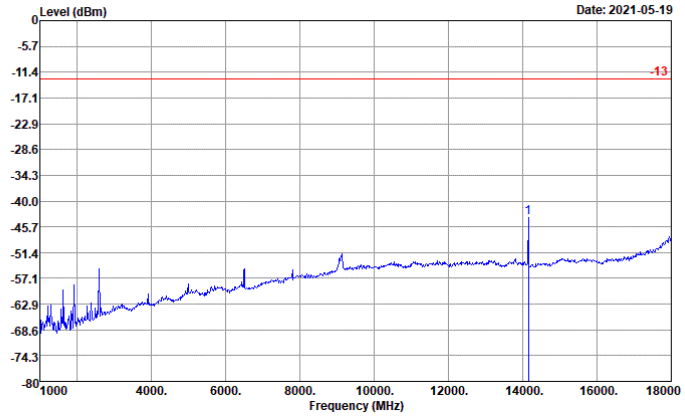


Site : 03CH19-HY
Condition : -13 ERP EIRP_20210305 VERTICAL
Project : 142801

	Freq	Level	Over Limit	Limit Line
	MHz	dBm	dB	dBm
1	90.14	-57.07	-44.07	-13.00

NR Band n261 (1GHz-18GHz)

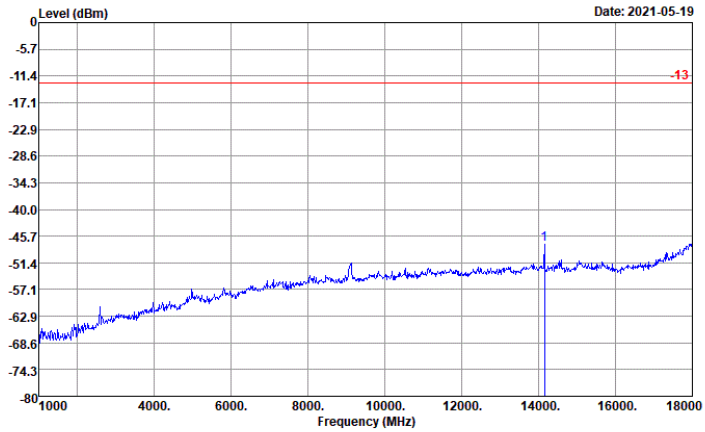
Horizontal



Site : 03CH19-HY
Condition : -13 ERP EIRP_20210305 HORIZONTAL
Project : 142801

	Freq	Level	Over Limit	Limit Line
	MHz	dBm	dB	dBm
1	14158.00	-43.67	-30.67	-13.00

Vertical



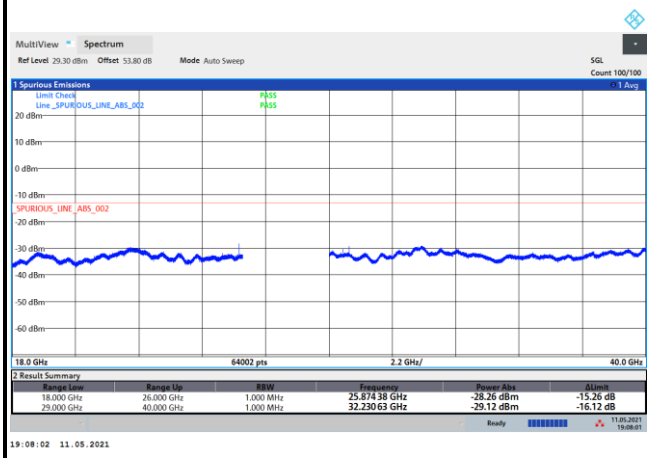
Site : 03CH19-HY
Condition : -13 ERP EIRP_20210305 VERTICAL
Project : 142801

	Freq	Level	Over Limit	Limit Line
	MHz	dBm	dB	dBm
1	14158.00	-47.36	-34.36	-13.00

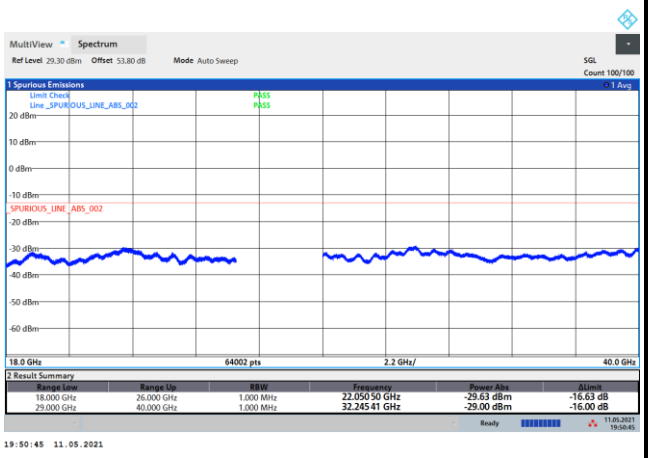
Spurious emission between 18GHz to 40GHz worst case plot is reported as following.

NR Band n261 QPSK (18-40GHz)

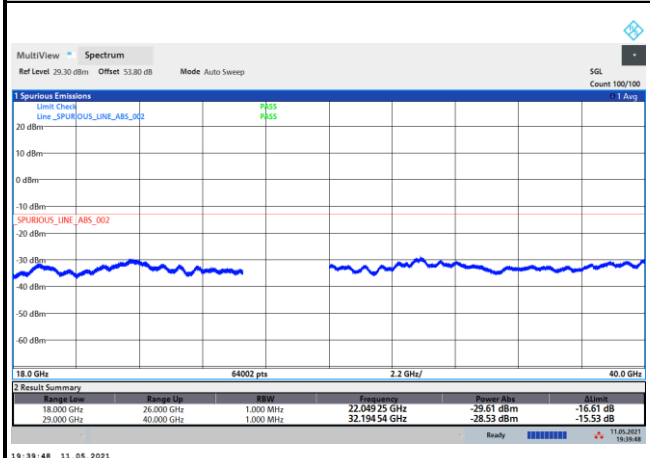
Lowest Channel / 100MHz



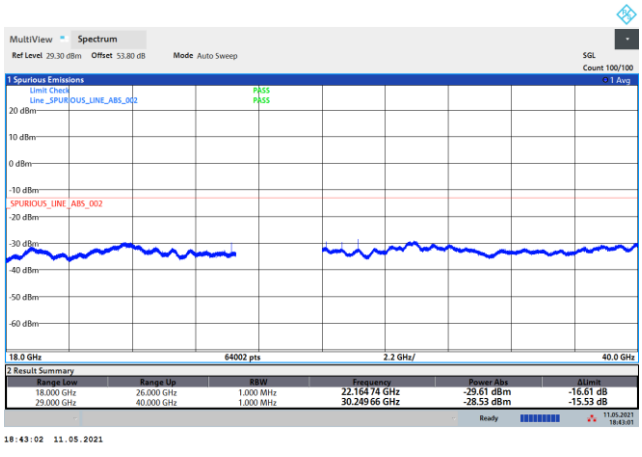
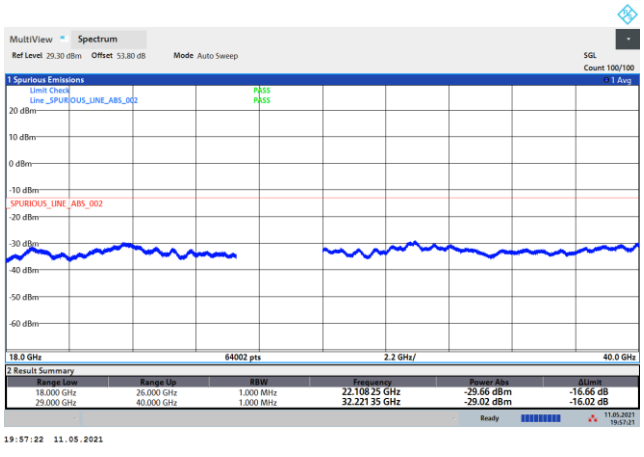
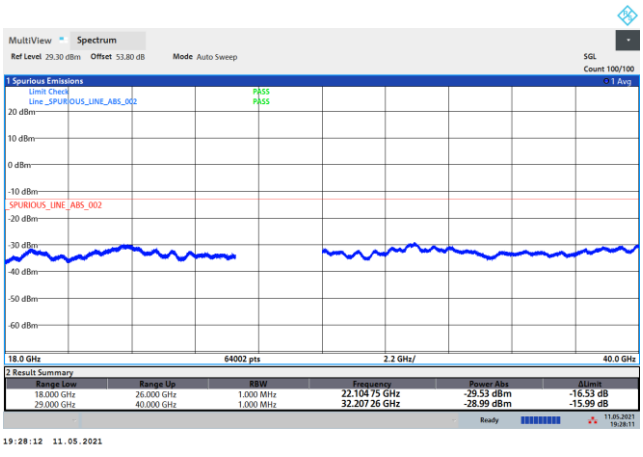
Middle Channel / 100MHz



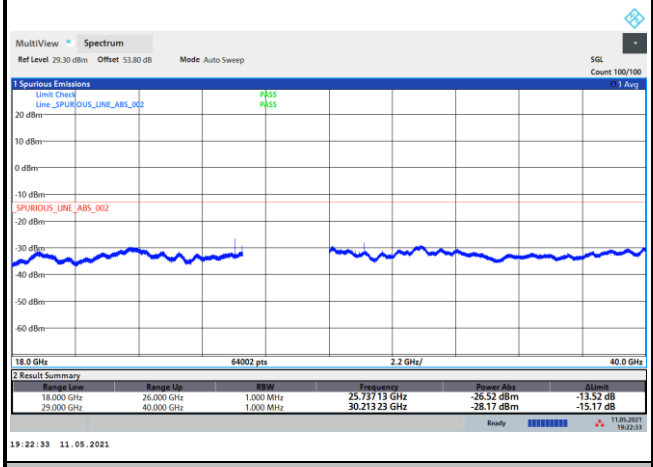
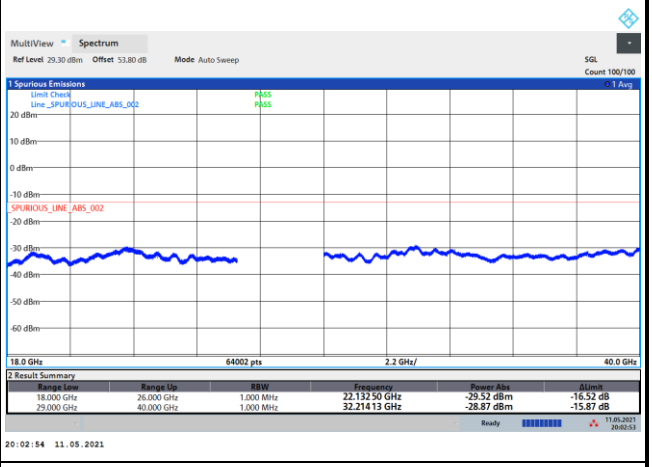
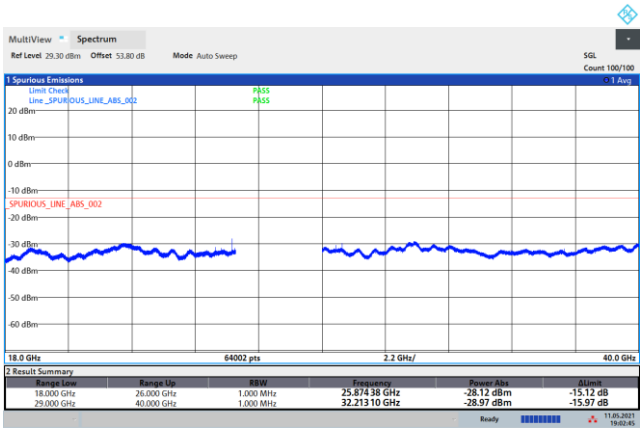
Highest Channel / 100MHz



Remark: Above plots, the spurious emissions were measured from 18GHz to 26GHz and 29GHz to 40GHz. The test results within the omitted frequency 26GHz to 29GHz were measured and reported in the section of Radiated Out of Band Emission with frequency range, 26GHz to 29GHz, and all spurious comply with limits.

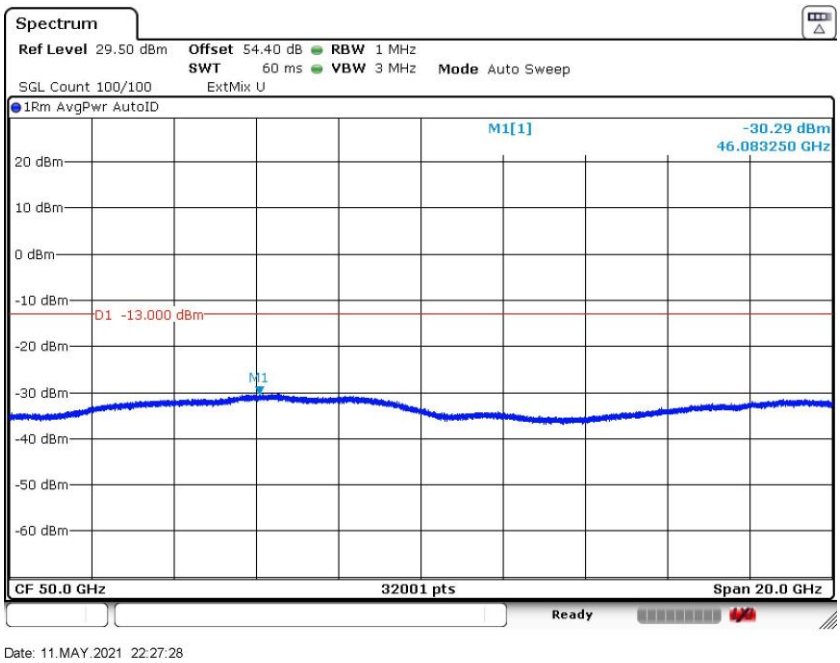
NR Band n261 QPSK (18-40GHz)	
Lowest Channel / 200MHz	**Middle Channel / 200MHz**
	
Highest Channel / 200MHz	
	

Remark: Above plots, the spurious emissions were measured from 18GHz to 26GHz and 29GHz to 40GHz. The test results within the omitted frequency 26GHz to 29GHz were measured and reported in the section of Radiated Out of Band Emission with frequency range, 26GHz to 29GHz, and all spurious comply with limits.

NR Band n261 QPSK (18-40GHz)	
Lowest Channel / 400MHz	**Middle Channel / 400MHz**
	
Highest Channel / 400MHz	
	

Remark: Above plots, the spurious emissions were measured from 18GHz to 26GHz and 29GHz to 40GHz. The test results within the omitted frequency 26GHz to 29GHz were measured and reported in the section of Radiated Out of Band Emission with frequency range, 26GHz to 29GHz, and all spurious comply with limits.

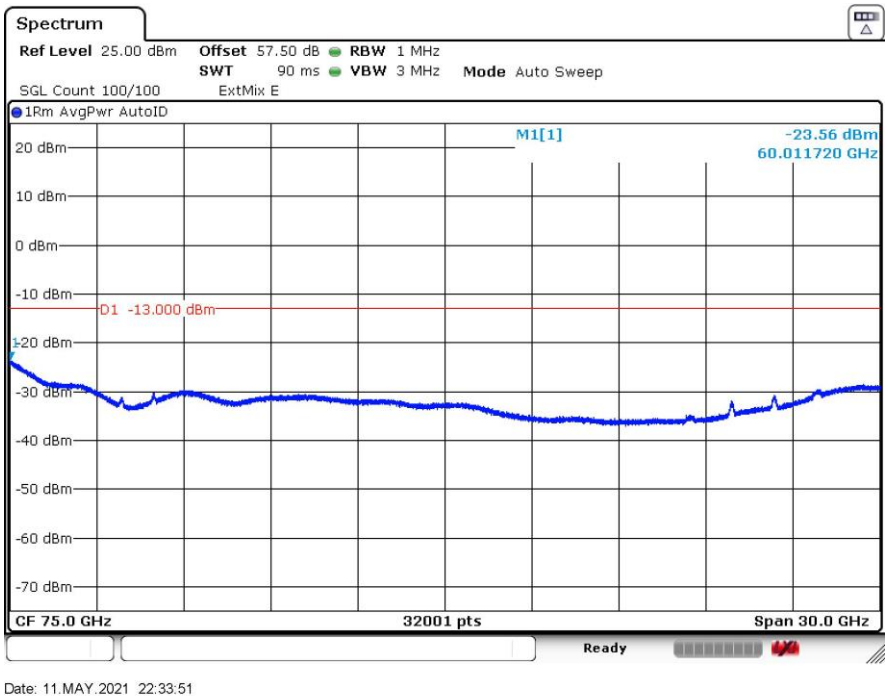
NR Band n261
(40GHz-60GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 42.3 + 0.34 + 107 + 20log(3) – 104.8 = 54.4 (dB)

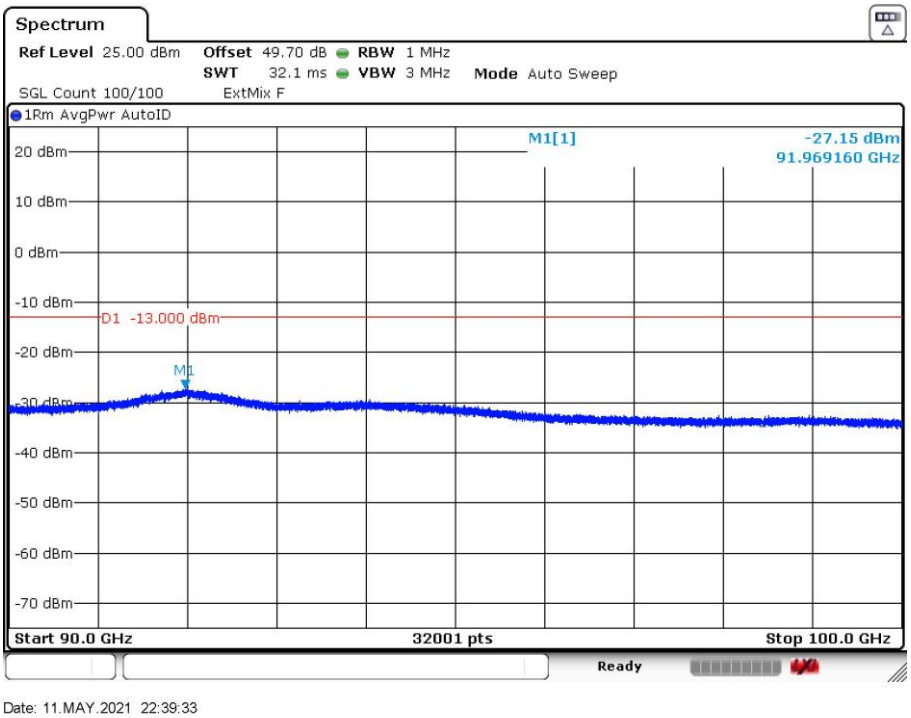
NR Band n261
(60GHz-90GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 45.4 + 0.34 + 107 + 20log(3) – 104.8 = 57.5 (dB)

NR Band n261
(90GHz-100GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 47.2 + 0.34 + 107 + 20log(1) – 104.8 = 49.7 (dB)

Frequency Stability

Test Conditions		NR Band n261 / Middle Channel			Limit
Temperature (°C)	Voltage (Volt)	CW tone			Note.
		Frequency (GHz)	Deviation (kHz)	Deviation (ppm)	Result
50	120	27.9248492	-4.000	0.143	PASS
40	120	27.9248462	-1.000	0.036	
30	120	27.9248452	0.000	0.000	
20(Ref.)	120	27.9248452	0.000	0.000	
10	120	27.9248462	-1.000	0.036	
0	120	27.9248482	-3.000	0.107	
-10	120	27.9248472	-2.000	0.072	
-20	120	27.9248442	1.000	0.036	
-30	120	27.9248442	1.000	0.036	
20	102	27.9248462	-1.000	0.036	
20	120	27.9248462	-1.000	0.036	
20	138	27.9248472	-2.000	0.072	

Note: The frequency fundamental emissions stay within the operation band.

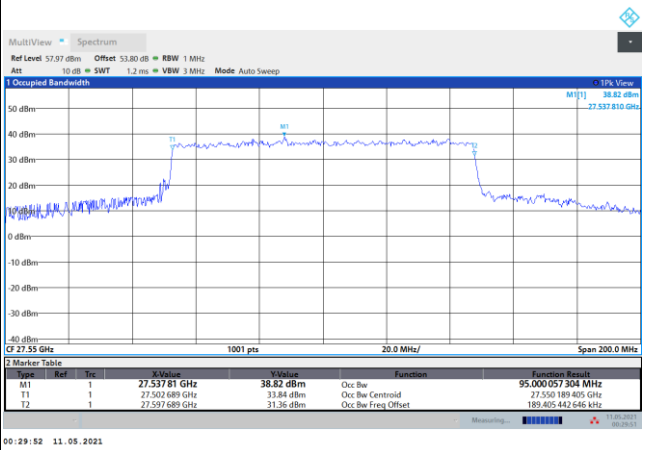
Appendix B.3 Radiated Test: NR Band n261 (Beam ID: 139)

Occupied Bandwidth

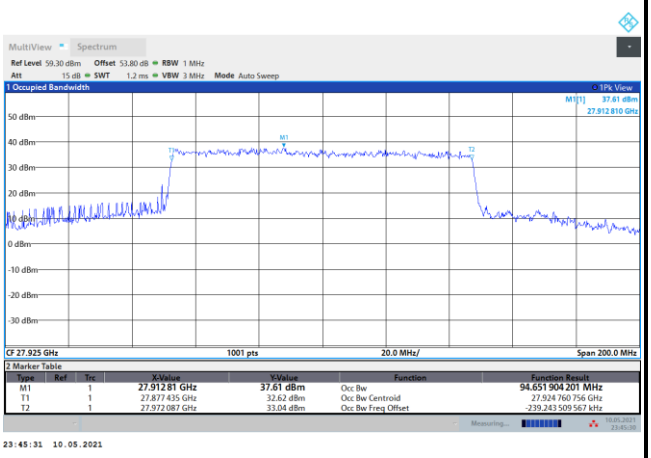
Mode	NR Band n261 : 99%OBW(MHz)		
BW	100MHz	200MHz	400MHz
Mod.	QPSK	QPSK	QPSK
Lowest CH	95.00	193.75	393.64
Middle CH	94.65	194.27	391.33
Highest CH	94.47	193.10	391.61

NR Band n261

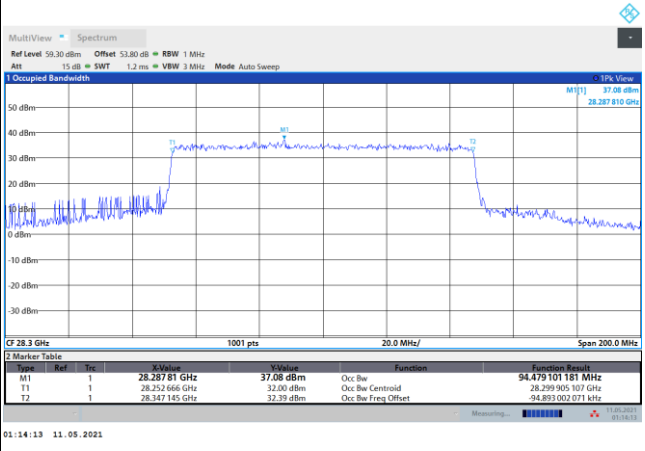
Lowest Channel / 100MHz / QPSK



Middle Channel / 100MHz / QPSK

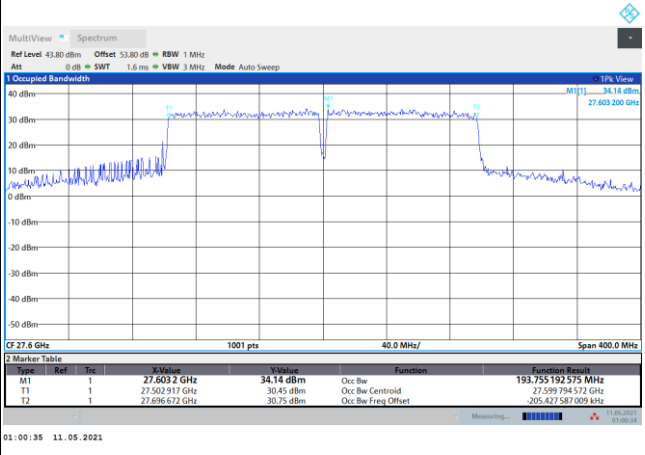


Highest Channel / 100MHz / QPSK

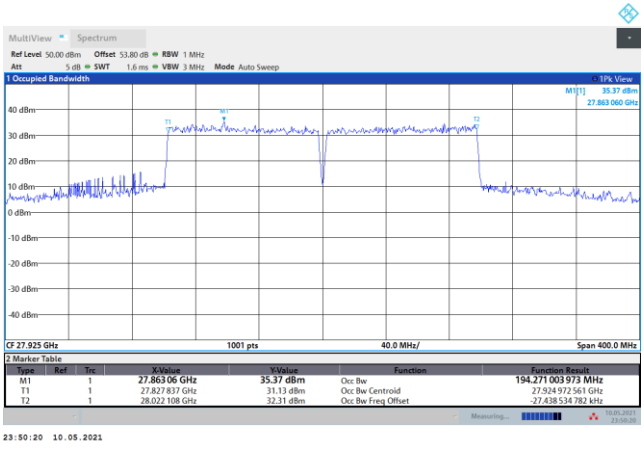


NR Band n261

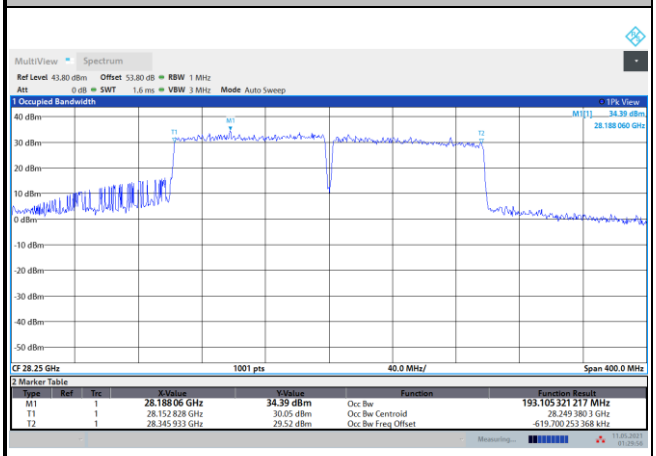
Lowest Channel / 200MHz / QPSK



Middle Channel / 200MHz / QPSK

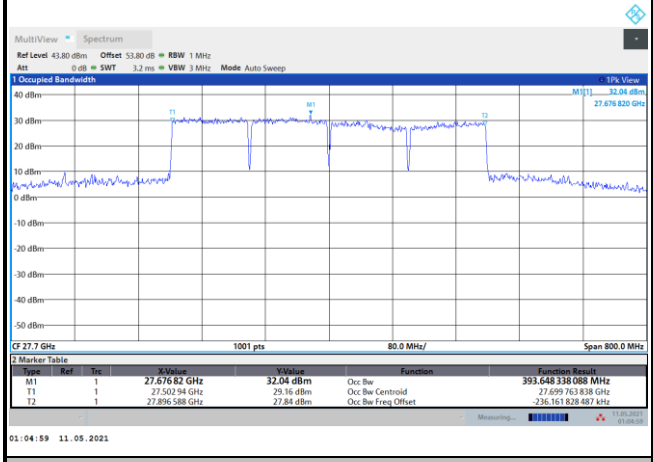


Highest Channel / 200MHz / QPSK

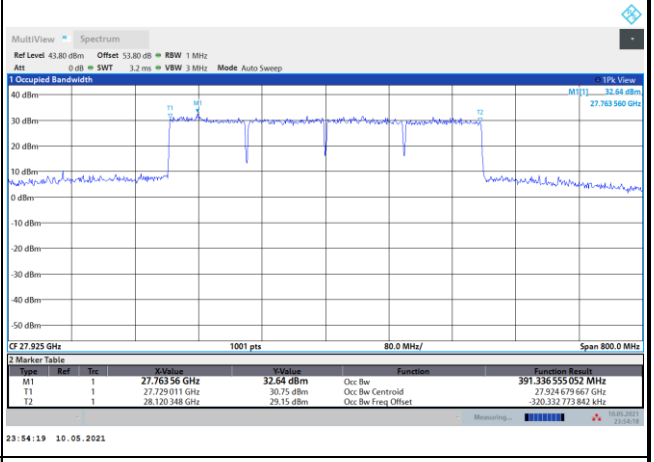


NR Band n261

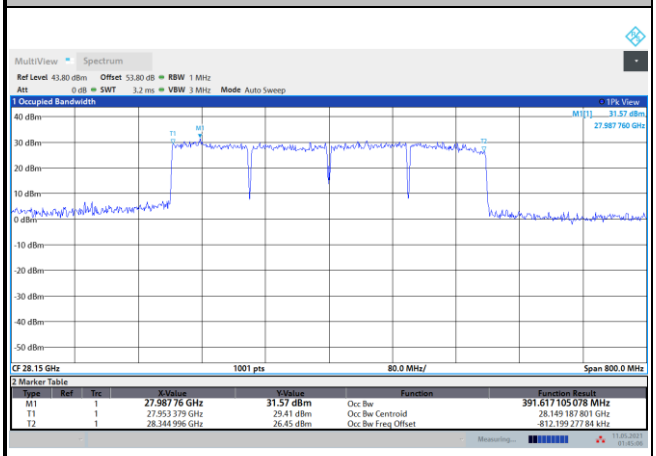
Lowest Channel / 400MHz / QPSK



Middle Channel / 400MHz / QPSK



Highest Channel / 400MHz / QPSK



Radiated Out of Band Emissions

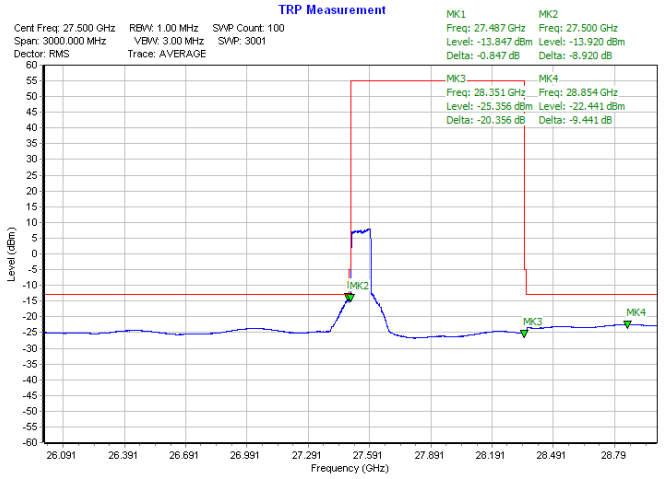
Test Result:

Mode		NR Band n261						
Channel	BW (MHz)	Modulation	0 ~ 10 %OB Limit (dBm/MHz)	0 ~ 10 %OB PSD (dBm/MHz)	Result	>10%OB Limit (dBm/MHz)	>10%OB PSD (dBm/MHz)	Result
Low	100	QPSK	-5	-13.92	Pass	-13	-13.47	Pass
Low	200	QPSK	-5	-12.13	Pass	-13	-13.70	Pass
Low	400	QPSK	-5	-15.77	Pass	-13	-14.75	Pass
Mid	100	QPSK	-5	-20.27	Pass	-13	-22.35	Pass
Mid	200	QPSK	-5	-19.86	Pass	-13	-22.38	Pass
Mid	400	QPSK	-5	-18.76	Pass	-13	-22.37	Pass
High	100	QPSK	-5	-19.72	Pass	-13	-18.38	Pass
High	200	QPSK	-5	-14.36	Pass	-13	-13.71	Pass
High	400	QPSK	-5	-14.79	Pass	-13	-13.33	Pass

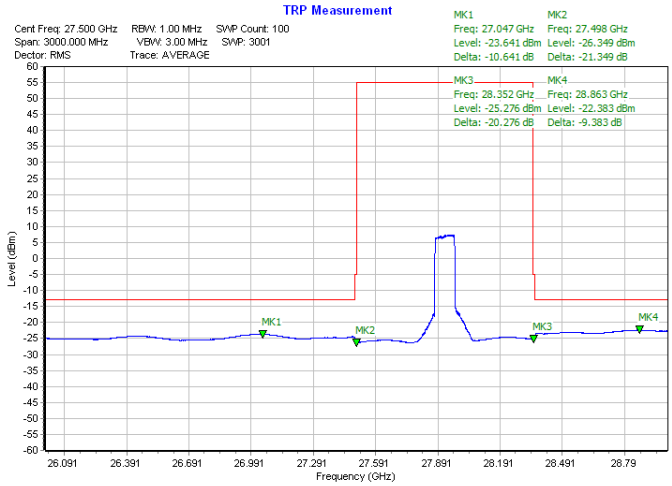
Remark: A duty factor of 1.3 dB (74% duty cycle) is added to the offset during the TRP Measurement.

NR Band n261 / 100MHz / QPSK

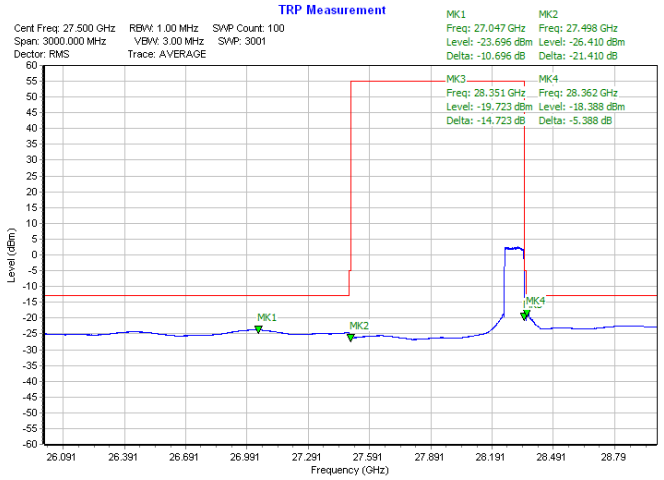
Lowest Band Edge



Middle Band Edge

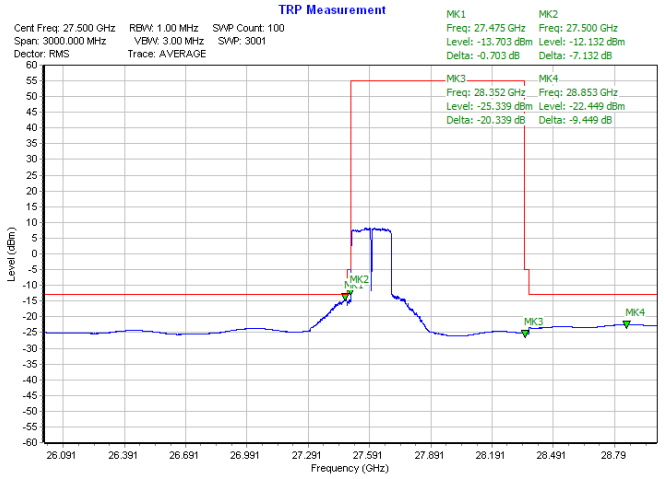


Highest Band Edge

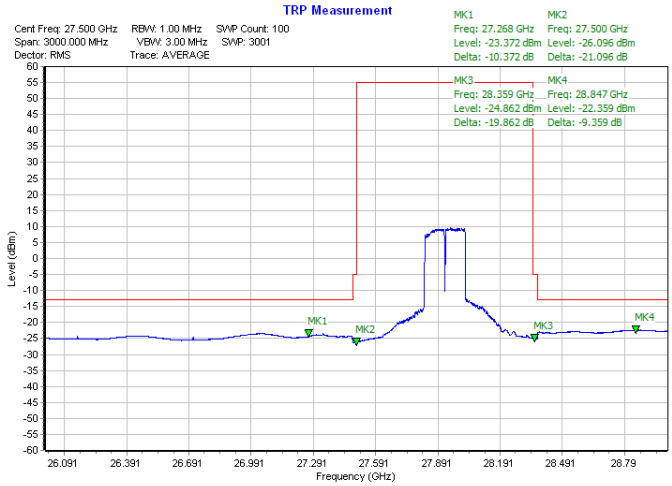
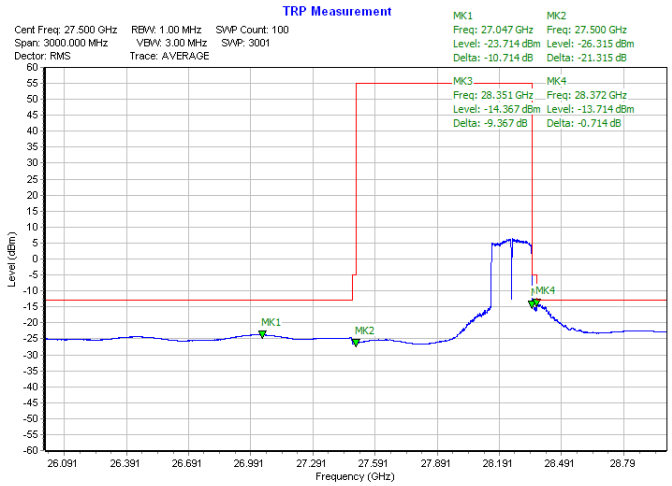


NR Band n261 / 200MHz / QPSK

Lowest Band Edge



Middle Band Edge



Highest Band Edge